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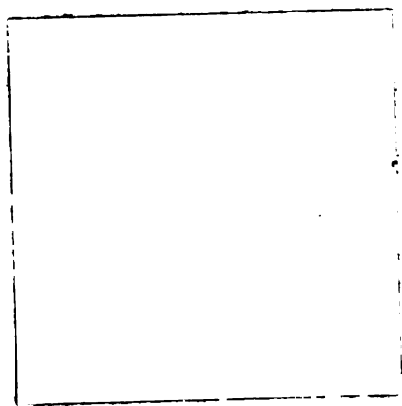
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**BULLETIN 456**

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OIL AND GAS FIELDS  
OF THE  
CARNEGIE QUADRANGLE, PENNSYLVANIA

BY

MALCOLM J. MUNN



WASHINGTON  
GOVERNMENT PRINTING OFFICE  
1911

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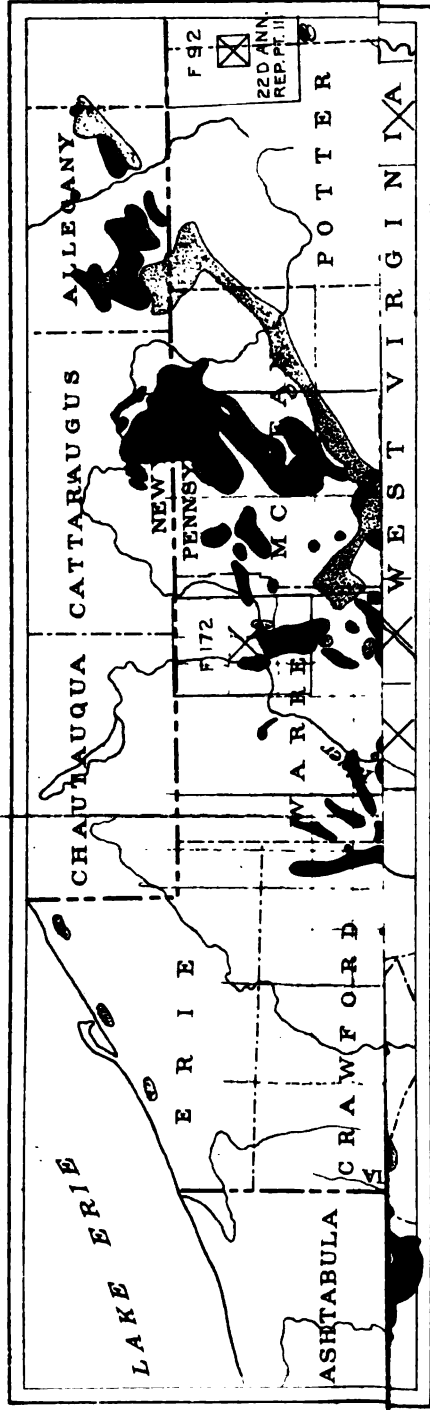






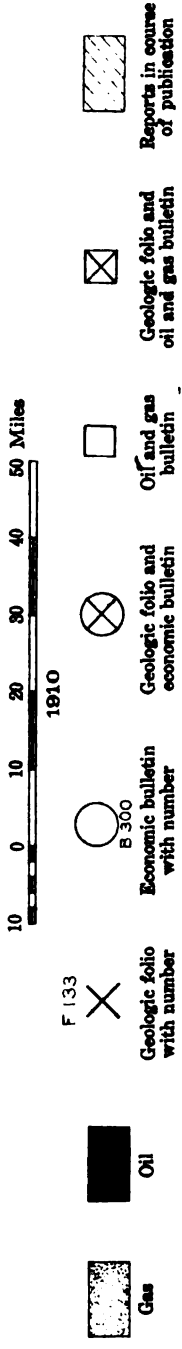
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BULLETIN 456 PLATE I



# SKETCH MAP OF WESTERN PENNSYLVANIA AND PARTS OF OHIO, WEST VIRGINIA, MARYLAND, AND NEW YORK

Showing oil and gas fields, location of quadrangles, and nature of geologic reports published on each



# **OIL AND GAS FIELDS OF THE CARNEGIE QUADRANGLE, PENNSYLVANIA**

By M. J. MUNN.

## **INTRODUCTION.**

Field work for a report on the oil and gas of the Carnegie quadrangle was begun by the writer July 23, 1907, and carried on intermittently until December 11 of the same year. The actual time consumed was about three months, the work including less than one month's service of G. L. Hagman as levelman. This statement does not include the time occupied in mapping the outcrop of the Pittsburgh coal and in drawing the structural contours—work that was done by G. C. Martin and George F. Peck in connection with geologic work for a folio on this quadrangle.

The writer wishes to acknowledge his indebtedness to hundreds of residents of the region examined for their universally courteous and friendly answers to his inquiries. Special acknowledgment is made to the officers and employees of the large number of oil and gas companies operating in this territory who have furnished hundreds of well records and other data of value.

## **GEOGRAPHY AND PHYSIOGRAPHY.**

### **LOCATION.**

The Carnegie quadrangle embraces an area of about 227 square miles in the southwestern part of Pennsylvania, in the vicinity of Pittsburgh. It is a quadrilateral, lying between parallels  $40^{\circ} 15'$  and  $40^{\circ} 30'$  north latitude and meridians  $80^{\circ}$  and  $80^{\circ} 15'$  west longitude. From Plate I it will be seen that this quadrangle includes portions of Allegheny and Washington counties. It is bounded on the north by the Sewickley quadrangle, of which an oil and gas bulletin is being published by the State of Pennsylvania and a folio by the United States Geological Survey. The geology of the Beaver quadrangle, cornering the Carnegie on the northwest, has been discussed in an economic bulletin (No. 286) and a folio (No. 134) of the United

States Geological Survey. The oil and gas of the Burgettstown and the Claysville quadrangles, which bound the Carnegie quadrangle on the west and southwest, have been discussed in Bulletin 318 of the Survey, and the geology of the Amity quadrangle, directly south, is presented in Bulletin 300 and Folio 144 of the Survey. The Pittsburgh quadrangle, situated east of the Carnegie, has not yet been investigated.

#### DRAINAGE AND TOPOGRAPHY.

The Carnegie quadrangle lies wholly within the drainage basin of Ohio River. Drainage from more than two-thirds of the quadrangle is through Chartiers Creek directly to Ohio River at McKees Rocks. Moon Run and Montour Creek convey considerable water from the northwestern part of the area into Ohio River at the lower end of Neville Island. In the eastern and southeastern parts a number of small streams drain into Monongahela River. As a rule the flood plains of these streams are very narrow, the adjacent hills being more or less precipitous at their bases but gradually flattening to well-rounded summits from 100 to 500 feet in height.

#### STRATIGRAPHY.

##### GENERAL CHARACTER OF THE ROCKS.

The materials composing the rocks of the Carnegie quadrangle were deposited as sediments under water. Each bed is therefore a more or less continuous stratum spread out over areas relatively large as compared with its thickness. All beds show variation in thickness and composition from place to place, because of the lack of uniform conditions of deposition. The sediments which formed the clays, shales, or "slates" of the drillers were fine-grained muds washed in by waves and streams. Sandstones came from sands, the grains of which were washed and assorted by waves and currents. The limestones of the quadrangle were probably formed from shells and other calcareous remains of animals that flourished in the seas, bays, and lagoons in which they were laid down. "Red rock" is a shale composed of finely divided particles of clay containing much iron oxide, and it was probably brought into the body of water in which it was deposited by streams from some old deeply weathered land surface. Coal was formed in swamps and shallow lagoons from vegetation that grew in or adjacent to them.

For convenience of description, these rocks are divided into two groups—those not exposed at the surface and those that outcrop. Stratigraphically, these groups are discussed by smaller subdivisions or formations, taken in the order of their deposition from oldest to youngest.

**ROCKS NOT EXPOSED AT THE SURFACE.****SOURCE OF INFORMATION.**

The writer's information concerning the rocks lying below the surface in the Carnegie quadrangle has been derived from a study of these rocks by other geologists at points of outcrop and from data furnished by logs of deep wells. Most of the drillings have been made for oil or gas by means of churn drills, a method which does not permit as close measurements or as detailed determinations of the beds encountered as the geologist desires. A large part of the wells of the Carnegie quadrangle were drilled years ago during the great oil excitement attending the development of some of the large fields. Many of these wells were put down by inexperienced drillers and others who, not realizing the geologic value of the material which might have been preserved, kept no record of the rocks penetrated before reaching the oil sands. Most of the records give only the depth of the well or the thickness of the oil or gas bearing bed, and hence are of very little stratigraphic value.

Another difficulty encountered by the geologist in attempting to use detailed records of wells lies in the fact that drillers have not followed a uniform standard of classification for the rocks. Each man called the material he encountered in a well what he thought it might be. If only one driller had operated in a given field, the task of correlating the rocks from his descriptions would be a comparatively easy one. In most fields, however, the drilling has been done by a number of men gathered from various parts of the region, where the geologic conditions are not the same, and each consciously or unconsciously tried to adopt the same nomenclature in the new field that he had been accustomed to in the old. It is therefore probable that if several such drillers had kept independent records of the same well, these would not have been alike in minor details. Again, drillers seldom take more than a passing interest in rocks near the surface in which no oil or gas occurs, and therefore do not usually record the depth and thickness of such beds with care. In a particular area, however, a pair of trained drillers, familiar with the succession of the strata, can drill well after well at points where the structure and the topography greatly change the geologic position of the mouths of the wells and still make records which, when adjusted for structure and topography, will be found as consistent as the nature of the beds penetrated will warrant.

The uncertainty involved in the use of well records for stratigraphic determinations is not diminished by a study of the oil and gas bearing beds at their outcrop, since these beds are so nearly horizontal over wide areas that they appear at the surface only at long distances from where they contain oil or gas pools, and hence they

may change greatly both in thickness and in composition in that distance. For these reasons the geologist is forced to deal largely in generalities in his studies of the stratigraphy of the rocks not exposed at the surface.

The following table gives a general idea of the geologic age and sequence of the more prominent beds encountered by the drill within the Carnegie quadrangle:

*General section of the unexposed rocks of the Carnegie quadrangle.*

Sys-tem.	Formation.	Name given by drillers.	Geological name.
Carboniferous.	Pottsville.....	{ Gas sand..... Salt or Forty-foot sand.....	Probably equivalent to Homewood sandstone member. Probably equivalent to Connoquenesing sandstone member.
	Pocono.....	{ Mountain or Big Injun sand..... Squaw sand..... Papoose sand..... Bitter Rock sand..... Butler gas, Butler Thirty-foot, Gas, Salt, or Murrys ville sand. (Probably = Berea sand.) Hundred-foot sand or Gantz and Fifty-foot.	Probably equivalent to Burgoon sandstone member.
Devonian (?).	Catskill (?).....	{ Nineveh Thirty-foot sand..... Snee (Blue Monday) sand, Stray-stray sand, and Boulder sand. Third Stray or Gordon Stray, or Campbell Run (?) sand. Third or Gordon sand..... Fourth sand..... Fifth sand.....	
Devonian.	Chemung (?).....	{ Bayard or Sixth sand..... Elizabeth sand..... Warren first sand (?)..... Warren second sand (?).....	
	Portago (?).....	.....	

It will be seen from an examination of the records given below that the terms "Salt" and "Gas" have been applied to a number of different beds. These are most widely applied, however, to the sandstone members of the Pottsville formation, though in the Carnegie quadrangle sandstone beds of the Allegheny formation, overlying the Pottsville, are probably frequently erroneously termed the "gas" and the "salt" sands by drillers. In this paper no attempt will be made to correlate the oil sands of this quadrangle with those of adjacent areas, it being considered best to call attention to Plates II and III, on which are shown the sections of 51 wells plotted to a scale and arranged with reference to the tops of the Pittsburg coal and of the Hundred-foot sand as datum planes. A careful comparison of these sections will give a fair idea of the difficulties encountered in making correlations. This difficulty is seen to be greater when we consider

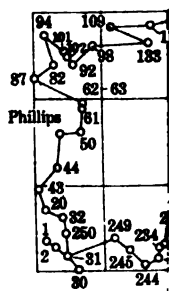
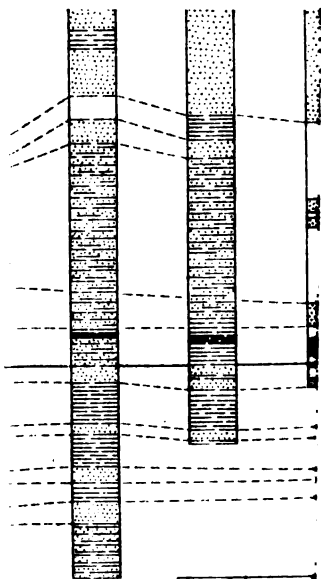
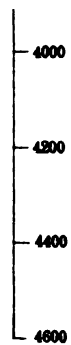


DIAGRAM SHOWS  
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that a very small portion of the horizontal distance covered by a line of sections across a quadrangle is represented by the rock actually passed through by the drill. There is no means of knowing what lithologic changes take place in the beds from well to well.

These plates show two lines of sections of wells across the quadrangle. They have been taken from a large number of records, the selections being made with reference to location of each well and to data shown by the log.

#### DEVONIAN SYSTEM.

The lowest rocks of which direct knowledge has been obtained in the vicinity of the Carnegie quadrangle were encountered in a deep well drilled by the Forest Oil Co. on the William Bedell farm, at West Elizabeth. This is the deepest well in Pennsylvania and possibly in the United States, having a depth of 5,575 feet. It penetrated to a depth of about 5,705 feet below the Pittsburgh coal and about 3,500 feet below the Fifth sand, which is the lowest bed producing oil in paying quantities in the quadrangle. A detailed section of this well plotted to a scale of 400 feet to the inch is shown in Plate II.

Within the Carnegie quadrangle a number of wells have been sunk several hundred feet below the lowest producing sand. One of the deepest of these holes is the John A. Beck No. 4 well (No. 159 on map) located in North Side, Pittsburgh. This well reached a depth of 4,089 feet and penetrated almost 4,000 feet of beds that do not outcrop on the surface in this quadrangle, and probably about 2,000 feet below the base of the rocks which are generally assigned to the Catskill formation. A complete record of this well as furnished by the owner, Mr. John A. Beck, follows:

*Record of the John A. Beck No. 4 gas well (No. 159), at Pittsburgh, Pa.*

[Elevation, 732 feet above sea level.]

Stratum.	Depth to top.	Thickness.	Depth to bottom.
	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
Ashes and clay.....		20	20
Gravel.....	20	49	69
Slate (water at 95 feet).....	69	30	99
Sand (driven pipe 75 feet).....	99	40	139
Slate.....	139	81	220
Sand.....	220	50	270
Slate.....	270	15	285
Lime.....	285	5	290
Slate.....	290	89	379
Coal.....	379	7	386
Slate (10-inch casing, 390 feet).....	386	50	436
Lime.....	436	30	466
Slate.....	466	10	476
Sand.....	476	30	506
Slate.....	506	10	516
Lime.....	516	15	531
Sand.....	531	45	576
Slate.....	576	124	700
Sand.....	700	10	710
Slate (8½-inch casing, 840 feet).....	710	35	745
Sand, Big Injun.....	745	319	1,064
Slate.....	1,064	10	1,074
Sand.....	1,074	70	1,144

*Record of the John A. Beck No. 4 gas well (No. 159), at Pittsburg, Pa.—Continued.*

Stratum.	Depth to top.	Thickness.	Depth to bottom.
	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
Slate.....	1,144	15	1,159
Sand.....	1,159	20	1,179
Slate.....	1,179	5	1,184
Sand.....	1,184	20	1,204
Slate and shell.....	1,349	46	1,395
Salt sand (salt water at 1,405 feet).....	1,395	95	1,490
Sand.....	1,490	30	1,520
Slate.....	1,520	10	1,530
Sand.....	1,530	115	1,645
Slate (64-inch casing, 1,645 feet).....	1,645	5	1,650
Sand (little gas at 1,655 feet).....	1,650	10	1,660
Slate.....	1,660	50	1,710
Sand.....	1,710	30	1,740
Slate.....	1,740	20	1,760
Sand (Gordon Stray ?).....	1,770	10	1,780
Slate.....	1,780	5	1,785
Red rock.....	1,785	5	1,790
Sand (Gordon ?).....	1,790	30	1,820
Slate.....	1,820	35	1,855
Sand.....	1,855	10	1,865
Slate and shell.....	1,865	60	1,925
Sand, Fifth.....	1,925	23	1,948
Slate and shell.....	1,948	82	2,030
Sand.....	2,030	10	2,040
Slate and shell.....	2,040	310	2,350
Sand.....	2,350	30	2,380
Slate.....	2,380	110	2,490
Sand.....	2,490	40	2,530
Slate.....	2,530	35	2,565
Sand.....	2,565	40	2,605
Slate.....	2,605	195	2,800
Sand.....	2,800	20	2,820
Slate.....	2,820	580	3,400
Sand.....	3,400	40	3,440
Slate and shell.....	3,440	560	4,000
Sand.....	4,000	40	4,040
Slate and shell.....			4,080½

The lower 700 feet of sandstones and "slate and shells" encountered in this well probably are of Portage age. Above them the 800 feet of shale and also about 500 feet of overlying "slate and shells" probably belong to the Chemung formation. No line of demarcation between these formations can be clearly established, since in regions where they do not outcrop paleontologic evidence is not available. The writer has tentatively considered the top of the Chemung to be the bottom of the lowest "red rock" mentioned in the records, which is sometimes found about 100 feet below the Fifth sand. However, the variability from place to place of these beds of red shale precludes any definite establishment of this boundary from well records alone.

Within the Carnegie quadrangle no oil or gas has been found in the rocks tentatively assigned to the Chemung formation, with the possible exception of a small quantity of gas in the Bayard or Sixth sand, at or near the supposed top of the formation. Farther north in Pennsylvania the Tiona, the Speechley, and the Warren sands, which are assigned to this formation, lie from about 400 to 800 feet below the Fifth sand of the Venango group of oil sands. In the Carnegie quadrangle a few thin beds of sandstone are frequently found at what seems to be about the horizons of the Warren, Speechley,

and Tiona sands, but there is no means at hand for making definite correlations. Indications of oil and gas have been found in these sand stones at a few places in the quadrangle, but, so far as the writer could learn, in no place is the production in quantities sufficient to justify development.

#### DEVONIAN (?) SYSTEM.

##### CATSKILL (?) FORMATION.

In the Carnegie quadrangle the rocks tentatively assigned to the Catskill formation comprise about 400 feet of strata containing red shale, and extend from the base of the lowest "red rock," about 100 feet below the Fifth sand, upward to the top of the "red rock" underlying the Hundred-foot sand. In addition to the characteristic red shale, which forms a small percentage of the entire thickness, these rocks are composed of variegated shale and thin reddish or white sandstones. These sandstones and the Hundred-foot sand immediately overlying the beds assigned to the Catskill comprise most of the Venango oil-sand group and have been found to contain almost all of the oil and by far the largest portion of the gas of southwestern Pennsylvania. The economic importance of these rocks renders necessary a somewhat more detailed discussion of the stratigraphy.

*Fifth sand.*—The horizon of the Fifth sand is represented by a white or gray lenticular bed of sandstone, lying about 100 feet above the base of the formation and about 2,200 to 2,250 feet below the Pittsburgh coal. (See well sections, Pls. II and III.) It is as much as 35 or 40 feet in thickness, but usually ranges between 15 and 30 feet. It is composed of fairly clean quartz sand, which changes from fine to coarse texture and even becomes conglomeratic very abruptly in both horizontal and vertical directions. In general a cross section of this sandstone shows several feet of hard medium to fine grained sand, embedded in which are thin lenses of coarse white sand and small quartz pebbles. These lenses are usually from 1 to 8 and, rarely, 20 feet in thickness, and constitute the "pays" or pay streaks in which the accumulations of oil and gas occur. The Fifth sand, which in this district is sometimes locally known as the McDonald sand, appears to be represented by a sandy phase of the formation at all points within the quadrangle, but it is sometimes marked by only a few feet of thin hard layers of sandstone interbedded with shale, which are designated by drillers as "slate and shells." Overlying this sand are from 40 to 60 feet of soft dark-greenish or red shales up to the base of the Fourth sand.

*Fourth sand.*—The sandstone called the Fourth sand is very similar in color, texture, and thickness to the Fifth sand. It is, however, somewhat more variable in occurrence, probably attains greater local thickness, and generally contains thinner and fewer pebbly pay streaks than the Fifth. This sand is separated from the

Third or Gordon sand above by from 50 to 75 feet of soft generally reddish or greenish shales, which frequently include thin beds of "red rock."

*Third or Gordon sand and Third Stray or Gordon Stray sand.*—These two sands are usually separated by a shale "break," which reaches in places a maximum thickness of 25 feet. In southwestern Pennsylvania they are known as the Gordon and the Gordon Stray sands, the name having been derived from a farm near Washington, Pa., where oil in the Gordon sand was first discovered in the county. Farther north, in Beaver, Butler, and Armstrong counties, these beds are known as the Third and the Third Stray sands. Over much of the Carnegie quadrangle they are so closely associated that no distinct shale "break" between them can be detected, and they have all the appearance of a single sand; at other places the shale "break" is as much as 40 feet in thickness, and the beds are distinct sandstones. Between these two extremes all gradations occur. When merged into a single sandstone these two beds have a thickness of 50 to 75 feet. When separate each is sometimes reduced to only a few feet of "slate and shells," though they usually range from 15 to 25 feet. The Third or Gordon sand, which is the lower, is usually composed of fine to medium grained quartz sand, white or gray in color, and, like all the sands of the Venango oil group, contains soft pebbly pay streaks of coarse sand, from which the oil and gas are produced. The Third Stray or Gordon Stray sand is usually gray or reddish and sometimes even dark in color. It appears to change rapidly in thickness from place to place and to contain fewer pay streaks than the Gordon.

*Boulder (?) sand.*—An interval of 40 to 80 feet separates the Gordon Stray sand from the Nineveh Thirty-foot sand above. Within the Carnegie quadrangle this interval is usually filled with shale and "red rock," in which is embedded here and there a thin sandstone lens. This sand is probably equivalent to the Boulder sand of the oil region farther north, but may more nearly correspond to the Snee (Blue Monday) sand of northern Allegheny County, which lies above the Boulder sand and under the Nineveh Thirty-foot sand, or to the Stray-stray sand of the southern part of Washington County. This sand appears to be best developed in the northern part of the quadrangle, where it is from 5 to 20 feet thick and occurs from 20 to 40 feet above the Gordon Stray.

In most of the Appalachian region drillers find difficulty in distinguishing the Boulder sand from the Gordon Stray sand below and from the Snee sand above.

*Nineveh Thirty-foot sand.*—The Nineveh Thirty-foot sand is the uppermost sandstone of what is considered to be the Catskill formation in this quadrangle. It lies from 90 to about 110 feet above the

Third or Gordon sand and about 50 to 110 feet below the base of the Hundred-foot sand. It is usually a hard, fine-grained, gray sandstone, from 10 to 30 feet thick, with a thin coarse sand and pebbly pay streak near the middle. The interval between the Nineveh Thirty-foot sand and the Hundred-foot sand is filled with soft green and red shales. The uppermost bed of "red rock" usually occurs only a few feet below the bottom of the Hundred-foot sand. This bed marks the upper limit of the deposits which are believed to represent the Catskill formation, the Hundred-foot sand above apparently belonging to the Pocono formation,<sup>a</sup> though a thick bed of red shale is frequently found overlying it.

#### CARBONIFEROUS SYSTEM.

##### MISSISSIPPIAN SERIES.

##### POCONO FORMATION.

In the Carnegie quadrangle the Pocono formation is about 850 feet thick. The lower and the upper portions consist of massive sandstone, inclosing toward the center from 300 to 450 or more feet of soft gray, red, and black shales.

*Hundred-foot sand.*—The Hundred-foot sand, which is regarded as the basal member of the Pocono formation, is one of the most persistent and widespread sands of the region. It is usually made up of two members, known in this quadrangle as the Fifty-foot and the Gantz sands. These, together with their intervening "break" of shale, range from 50 to about 115 feet in thickness. The lower or Fifty-foot sand seems to be much more persistent than the Gantz, which is lenticular in the northern and central parts of the quadrangle but thickens and becomes more uniform toward the south.

Both members of the Hundred-foot sand are typical oil sands, white or gray in color, of medium grain and hardness, and containing here and there lenses of coarse, pebbly sand which are sometimes filled with oil, gas, or salt water. Above the Hundred-foot sand is an interval of from 20 to more than 100 feet which is usually filled with red and green shales. The "red rock" at this horizon is one of the most persistent within the quadrangle. Its thickness in some wells is 90 feet or more, and it forms a characteristic geologic marker for drillers over much of this area.

*Murrysville or Butler Thirty-foot sand.*—Upon the "red rock" generally lies a lenticular sandstone that is in places as much as 150 feet thick and is usually considered to be the equivalent of the Murrysville Gas sand of Westmoreland County, farther east. In Butler

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<sup>a</sup> Butts, Charles, Rept. Top. and Geol. Survey Comm., Pennsylvania, 1906-1908, p. 197.

and Armstrong counties a gas-bearing sand which seems to be equivalent to this bed is generally known as the Butler Gas sand, Butler Thirty-foot, or Thirty-foot sand. Farther west, in Washington and Beaver counties, a sand at what seems to be this horizon is generally designated as the Berea sand, and is considered by drillers to be equivalent to the Berea sandstone of northern Ohio. Charles Butts,<sup>a</sup> who has recently published some interesting facts relative to the correlation of these beds, considers the Berea sandstone of Ohio to be equivalent to the Hundred-foot sand of northern Pennsylvania, and therefore older than the Murrysville or Butler Thirty-foot sand of the Carnegie quadrangle. With the data now available it seems impossible to define clearly the position of the true Berea sandstone of Ohio in the geologic column of southwestern Pennsylvania. The writer does not question the correlation by Butts for northern Pennsylvania, but in tracing the Hundred-foot sand southward to Washington County from Clarion County there is evidence that this sand is broken by persistent shale beds into a group of sandstones embracing the Fifty-foot, the Gantz, and the Murrysville or Butler Thirty-foot sands, and that the last sand is equivalent to the thin oil-bearing sand of southeastern Ohio, which is widely known as the Berea sand. If this is true, the Berea sand of southeastern Ohio is equivalent to only the upper portion of the Berea of northern Ohio.

Between the top of the Murrysville or Butler Thirty-foot sand and the bottom of the Big Injun sand are from 300 to 450 feet of soft dark or gray sandy shale, in which one or more thin beds of sandstone are found in most of the wells drilled through this formation. These sands are very irregular in occurrence, however, and appear to occupy no definite horizon. In a number of wells the whole interval is reported as shale; in others it is made up of thin alternating beds of shale and hard sandstone. In the Carnegie quadrangle these sands in places contain more or less salt water but little or no oil or gas. The lower of the two more persistent beds is called by some drillers the Bitter Rock sand. The upper bed is generally called the Squaw sand, though this name is also applied to a sandstone near the base of the Big Injun.

*Big Injun sand.*—Throughout the Carnegie quadrangle this great sandstone, ranging from about 200 to 400 feet in thickness, is easily recognized by oil drillers. It is usually a very hard, medium-grained white or gray sandstone, generally unbroken by shale partings, but locally divided into two or more sands by thin "breaks" of dark shale, rarely more than 10 or 20 feet in thickness. This sandstone

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<sup>a</sup> Rept. Top. and Geol. Survey Comm. Pennsylvania, 1906-1908. p. 190.

contains in many places large quantities of salt water and in a few places pools of gas, both the water and the gas being confined to soft, porous lenses only a few feet thick and of small extent.

#### MAUCH CHUNK FORMATION.

In the southern part of the Carnegie quadrangle drillers frequently report from 5 to 50 feet of limestone which is usually designated as the Big lime and which is doubtless equivalent to the Greenbrier limestone member of the Mauch Chunk of the Appalachian Basin, farther south. In a number of places this limestone is overlain by soft shale from 10 to 100 feet in thickness. A few feet of the lower part of this shale has the characteristic red color of the Mauch Chunk, and it seems probable that this entire shale mass belongs to that formation. Traced northward, these beds pinch out near the middle of the quadrangle, but small isolated outliers may perhaps be found. The disappearance of these beds toward the north is doubtless due to a great unconformity at the top of the Mississippian series.

#### UNCONFORMITY.

It seems very probable that the Greenbrier limestone member and the overlying shale of the Mauch Chunk formation were once deposited to an unknown thickness over the entire quadrangle. Subsequently this area was elevated and became dry land, the greatest movement being at the north. The land was exposed to erosion long enough for the streams to remove all of these beds from an indefinite area lying farther north and west and to return this material to the adjacent sea bottom. The thin remnants of the shale of the Mauch Chunk formation and its Greenbrier limestone member in the Carnegie quadrangle are all that remained uneroded when the land was again submerged and the deposition of the Pottsville formation began. This erosion interval was of shorter duration toward the southeast, and hence in that direction the Mauch Chunk thickens. It should be remembered, however, that all points where the Greenbrier limestone member is covered by the red shale of the Mauch Chunk, it could not have been subjected to erosion, and is therefore in its full thickness. The minimum original thickness of the limestone in this quadrangle is only a few feet as against several hundred or a thousand feet in West Virginia, Kentucky, and Tennessee. It is therefore reasonable to suppose that this bed never extended much farther north than the Carnegie quadrangle.



## PENNSYLVANIAN SERIES.

## POTTSVILLE FORMATION.

*Geologic history.*—At the end of Mauch Chunk time a broad uplift in western Pennsylvania and adjacent parts of New York, Ohio, and West Virginia brought the recently deposited Mauch Chunk formation above sea level and exposed it to erosion. This erosion continued longest in northwestern Pennsylvania and New York, where not only the Mauch Chunk formation but the Burgoon sandstone member of the Pocono formation and the entire shale underlying it were removed and redeposited in adjacent sea as Pottsville beds. Deposition of early Pottsville beds probably began at the northwest, and as subsequent subsidence took place the shore line encroached upon the land lying to the southeast and successively younger beds were deposited unconformably upon the old land surface. This period of subsidence was not continuous, but was interrupted by at least one period during which coal-forming vegetation grew in portions of a large region northwest of this quadrangle, and the Sharon conglomerate member and the Sharon coal were then formed. During this period of early Pottsville deposition probably no beds were laid down in the area embraced by the Carnegie quadrangle.<sup>a</sup> When subsidence finally began and the sea encroached over this territory a coarse sandstone, probably the Connoquenessing sandstone member, was spread out over the sea bottom from the advancing shore line, and therefore lies unconformably upon the remnants of the Mauch Chunk formation.

*Members.*—In most of northwestern Pennsylvania the Pottsville consists of (1) the Homewood sandstone member at the top, (2) the Mercer shale member (consisting of shales, coals, limestones, and fire clay), (3) the Connoquenessing sandstone member and Quakertown coal, and (4) the Sharon conglomerate member and coal at the base, the whole having a total thickness of probably less than 400 feet. In this quadrangle the different divisions of the formation are indistinguishable in well records, the sections showing such abrupt changes from place to place that no definite correlation of the beds overlying the Big Injun sand can be made. In fact, an examination of the well sections (Pls. II and III) shows that the Big Injun sand itself can not always be separated with certainty from the sandstones of the Pottsville formation above, since in areas where the upper shale of the Mauch Chunk and the Greenbrier limestone member were removed by erosion the basal sandstone of the Pottsville appears to rest directly upon the eroded surface of the Big Injun sand.

<sup>a</sup> Butts, Charles, Rept. Top. and Geol. Comm. Pennsylvania, 1906-1908, p. 190.

*Salt sand.*—As shown by the well sections (Pls. II and III), the Salt sand of the drillers constitutes from less than 100 to more than 300 feet of sandstone overlying the Mauch Chunk in the southern part of the quadrangle and resting directly upon the Big Injun sand farther north. This is a coarse, pebbly gray to reddish quartz sand, which, like the Big Injun, frequently carries large quantities of salt water and occasionally small pools of gas. In many places this appears to be separated into two beds with a shale "break" which reaches a maximum thickness of as much as 50 feet. In such cases the upper bed is frequently designated by drillers as the Gas sand. The extreme variability of the beds above the unconformity renders any correlation from well records very doubtful, and it is possible that the so-called Gas sand may in reality be equivalent to the Homewood sandstone member at the top of the Pottsville formation. The uncertainty of this correlation is augmented by the poor measurements made of these beds by drillers.

#### ALLEGHENY AND CONEMAUGH FORMATIONS.

The Allegheny and Conemaugh formations, which constitutes the upper 500 to 800 feet of the unexposed rocks of the Carnegie quadrangle, contain no oil or gas bearing beds of importance, and hence have received scant notice from drillers. In this region the Allegheny formation consists of about 300 feet of shales, coals, clays, limestones, and thin sandstones, extending from the top of the Gas sand up to the top of the Upper Freeport coal. The Conemaugh has a total thickness of 500 to 600 feet, and includes all rocks between the top of the Upper Freeport coal and the bottom of the Pittsburgh coal bed. The upper 400 or 500 feet of this formation are exposed in outcrop along the Ohio River and in some of the deeper valleys, and it is therefore discussed under "Rocks exposed at the surface."

*Mahoning sandstone member (Dunkard sand).*—The unexposed portion of the Conemaugh formation consists principally of sandstone and sandy shale, including the Mahoning sandstone at the base, which ranges from 30 to more than 100 feet in thickness. This sandstone is usually separated into two members by a clay and shale "break," ranging up to 30 feet or more in thickness. The two sandstones are generally termed the Big and the Little Dunkard sands. They usually contain fresh or salt water in considerable quantities, and in a few places in the quadrangle furnish small "pockets" of gas.

In the extreme southwestern part of Pennsylvania and adjacent portions of West Virginia these sands furnish a number of good oil and gas pools at points where the sands are between 1,000 and 2,000 feet below the surface. The other beds of these formations are of little or no economic interest to oil and gas producers.

## THICKNESS AND CHARACTER OF UNEXPOSED STRATA AS SHOWN BY LOGS OF DEEP WELLS.

The following detailed records show the general nature of the material from which stratigraphic studies of the unexposed rocks of this quadrangle are made. Sections of some of these wells are also shown on Plates I and II.

*Record of Samuel Conners well No. 3 (No. 6 on map), Cecil Township, Washington County, Pa.*

[Owned by Manufacturers' Light & Heat Co. Elevation of well mouth above sea level, 1,012 feet.]

Stratum.	Depth to top.	Thick-ness.	Depth to bottom.
	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
Pittsburg coal.....	134	6	140
Murphy sand.....	315	40	355
Sand.....	505	25	530
Hurry-up sand.....	550	10	560
Coal.....	705	5	710
Coal.....	800	5	805
Sand.....	860	15	875
Sand.....	900	5	905
Sand.....	1,000	50	1,050
Salt or Gas sand (water at 1,090 feet).....	1,075	85	1,160
Sand.....	1,170	20	1,190
Sand.....	1,225	10	1,235
Coal.....	1,235	5	1,240
Lime.....	1,265	3	1,268
Big Injun sand.....	1,296	184	1,480
Squaw sand.....	1,540	20	1,560
Sand.....	1,600	15	1,615
Thirty-foot sand.....	1,815	70	1,885
Gantz sand.....	1,972	22	1,994
Fifty-foot sand (gas at 2,008 feet).....	2,007	60	2,067
Butler Thirty-foot sand.....	2,125	25	2,150
Stray sand.....	2,185	38	2,223
Gordon sand (oil at 2,232 feet).....	2,225	33	2,258
Fourth sand (slate break 2,287-2,291 feet).....	2,280	14	2,294
Fifth sand (oil at 2,347 feet).....	2,343	16	2,359

*Record of Jones & Laughlin well No. 1 (No. 156 on map), Pittsburg, Allegheny County, Pa.*

[Owned by American Iron & Steel Co. Elevation of well mouth above sea level, 735 feet. Second Geol. Survey Pennsylvania, vol. 13, p. 730.]

Stratum.	Depth to top.	Thickness.	Depth to bottom.
	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
Sandy slate and shells.....	50	15	95
Slate.....	95	15	110
Sandstone, white.....	110	60	170
Sandstone, shaly.....	170	15	185
Sandstone, gray.....	185	33	218
Slate.....	218	12	230
Sandy slate and shale, very fine, mica, some gray limestone and coal, slate near top, trace of lime all through.....	230	58	288
Sandy slate and shells.....	288	27	315
Slate, black, and trace of coal.....	315	20	335
Sandy slate and shells, faint trace of lime.....	335	35	370
Sandstone, white, fine mica, gray at top and bottom.....	370	70	440
Slate, black; coal 3 feet.....	440	10	450
Sandy slate, dark, granulating like sand.....	450	55	505
Sandy slate and brown and white shells, trace of coal.....	505	15	520
Sandy slate, gray, fine, mica; much lime.....	520	20	540
Slate, black.....	540	45	585
Sandy slate, and sandstone, fine, dark-brownish gray.....	585	10	595

*Record of Jones & Laughlin well No. 1 (No. 156 on map), Pittsburg, Allegheny County, Pa.—Continued.*

Stratum.	Depth to top.	Thickness.	Depth to bottom.
	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
Sandstone, white, medium, compact, white specks.....	595	50	645
Slate, black, coal.....	645	10	655
Sandstone, dark ash gray, fine.....	655	25	680
Sandy slate, chocolate brown, fine, mica.....	680	30	710
Slate, dark with gray shells.....	710	20	730
Sandstone, white, medium compact.....	730	40	770
Slate, black, with some coal.....	770	20	790
(?) Specimens omitted.....	790	35	825
Siliceous limestone.....	825	20	845
Siliceous limestone, like bluish sandy shale.....	845	8	853
Siliceous limestone, like gray light sand.....	853	27	880
Slate and gray sand shell.....	880	30	910
Sandy slate, dark gray, fine, mica.....	910	35	945
Sandstone, white, medium, compact; some dark slate at 1,045 and 1,060 feet.....	945	160	1,105
Slate, dark, pure.....	1,105	60	1,165
White sand and dark sandy slate; "salt and pepper rock".....	1,165	35	1,200
Sandy slate, and bluish slate.....	1,200	20	1,220
Sandstone, grayish; fine flaky mica, with layers of dark slate.....	1,275	20	1,295
Slate, a little sandy 20 feet; common 45 feet; a little sandy 65 feet.....	1,295	130	1,425
Sandstone, gray, fine; some lime; "Gas sand" (Berea).....	1,425	25	1,450
Slate, common; little sandy top and bottom.....	1,450	75	1,525
Sandstone, white, top fine; center and bottom quite coarse (Hundred-foot).....	1,525	93	1,618
Slate, granulating like sand.....	1,618	7	1,625
Sandstone, white and brown (fine) mixed.....	1,625	10	1,635
Slate and shells, dark.....	1,635	8	1,643
Sandstone, white; top, gray and mixed with sandy slate; bottom, white, little slate; pebble shell at 1,650 feet.....	1,643	25	1,668
Slate and sandy shells.....	1,668	7	1,675
Sandstone, white, medium; pebble shell at 1,705 feet.....	1,675	45	1,720
Sandy shale, red and green.....	1,720	20	1,740
Slate and shells.....	1,740	15	1,755
Slate, common.....	1,755	43	1,798
Sandstone, pebbly, good flow of gas (Gordon).....	1,798	7	1,805
Slate, black, iron pyrites (probably some shells at top).....	1,805	15	1,820
Slate, dark, with greenish-gray shells and streaks of red.....	1,820	13	1,833
Slate, blue black.....	1,833	27	1,860
Sandstone, yellowish gray, fine, very hard.....	1,860	8	1,868
Slate and shells.....	1,868	12	1,880
Sandy slate, red and green, soft, with very red clay.....	1,880	10	1,890
Sandstone, yellowish gray, fine, hard.....	1,890	10	1,900
Slate and shells, bluish gray.....	1,900	3	1,903
Slate and shells, greenish gray and red.....	1,903	12	1,915
Sandstone, yellowish gray, medium.....	1,915	7	1,922
Slate, common.....	1,922	24	1,946
Slate and shells.....	1,946	8	1,954
Sandstone, yellowish gray, medium, very hard.....	1,954	2	1,956
Slate and sand, greenish gray and red lime.....	1,956	3	1,959
Sandstone, greenish gray with reddish slate.....	1,959	3	1,962
Slate and shells.....	1,962	6	1,968
Slate, sandy.....	1,968	11	1,979
Sandstone, white, fine, mica, flaky, hard.....	1,979	7	1,986
Slate, common.....	1,986	22	2,008
Slate with sand shells.....	2,008	17	2,025
Sandstone, white, very fine and hard.....	2,025	9	2,034
Slate, common.....	2,034	132	2,166
Slate, sandy, with some reddish layers.....	2,166	77	2,243
Slate, a portion of it shelly.....	2,243	148	2,391
Slate, sandy, much mica, ballings sometimes dark red.....	2,391	90	2,481
Slate, common (fossils at 2,485 feet).....	2,481	136	2,617
Sandstone and slate, brownish gray, micaceous.....	2,617	4	2,621
Slate, with 2-foot fossil band at 2,660 feet.....	2,621	44	2,665
Slate with pyrites and some fossils.....	2,665	246	2,911
Slate, some fossil bands.....	2,911	89	3,000

Some gas struck at 1,798 feet; large flow at 1,804 feet. This well is located on the east side of Twenty-sixth Street, near the river, twenty-fifth ward, Pittsburg, South Side.

*Record of N. Fife well No. 1 (No. 205), Upper St. Clair Township, Allegheny County, Pa.*

[Owned by Manufacturers Light & Heat Co. Altitude, 1,036 feet.]

Stratum.	Depth to top.	Thickness.	Depth to bottom.
	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
Pittsburg coal.....	185	7	192
Hurry-up sand.....	525	20	575
Sand.....	735	10	745
Sand.....	760	30	790
Coal.....	875	9	884
Coal.....	930	10	940
Sand.....	980	25	1,005
Lime.....	1,060	40	1,130
Salt sand.....	1,150	30	1,180
Show of coal.....	1,265		
Sand.....	1,295	20	1,315
Big lime.....	1,327	23	1,350
Big Injun sand.....	1,350	255	1,605
Sand.....	1,625	18	1,643
Sand.....	1,655	10	1,665
Squaw sand.....	1,700	40	1,740
Thirty-foot sand.....	1,876	57	1,933
Gantz sand.....	2,060	22	2,082
Fifty-foot sand (water at 2,123 feet).....	2,089	77	2,166
Lower Thirty-foot sand.....	2,180	10	2,200
Sand.....	2,229	28	2,257
Sand.....	2,262	9	2,271
Sand (Gordon ?).....	2,300	20	2,320
Sand (Gordon ?).....	2,326	24	2,350
Sand.....	2,353	37	2,390
Sand (Fourth ?).....	2,394	21	2,415
Sand (Fifth ?).....	2,435	50	2,485
Slate and shells (to bottom of well).....	2,485	265	2,750
Dry hole.			

*Record of Parks well No. 1 (No. 234), Peters Township, Washington County, Pa.*

[Altitude, 1,050 feet (?).]

Stratum.	Depth to top.	Thickness.	Depth to bottom.
	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
Pittsburg coal.....	265		
Sand (salt water at 1,080 feet).....	900		
Gas sand.....	1,100	60	1,160
Salt sand (water at 1,250 feet).....	1,220	75	1,295
Big Injun sand (little oil).....	1,410	250	1,660
Gantz sand.....	2,137	21	2,158
Fifty-foot sand (little gas at 2,195 feet).....	2,170	60	2,230
Gordon Stray sand.....	2,365	20	2,385
Slate, break.....	2,385	10	2,395
Gordon sand (oil at 2,415 feet).....	2,395	30	2,425
Fourth sand.....	2,450	25	2,475
Fifth sand.....	2,510	25	2,535
Total depth.....			2,550

Record of David Resse well No. 1 (No. 221), Peters Township, Washington County, Pa.

[Owned by Cambria Oil Co. Altitude, 1,027 feet.]

Stratum.	Depth to top.	Thickness.	Depth to bottom.
	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
Conemaugh:			
Pittsburg coal.....	5		
Water.....	92		
8-inch pipe.....	206		
Coal, gas, and water.....	597	5	602
Dunkard sands (some gas).....	650	100	750
Coal (Upper Fréport ?).....	750	5	755
Block slate.....	755	235	990
Salt sand (little water and gas at 1,090 feet).....	990	120	1,110
Soft slate.....	1,110	20	1,130
Big lime.....	1,130		
Big Injun sand (gas at 1,230 feet and 1,245 feet).....	1,165	242	1,407
Slate.....	1,407	43	1,450
Squaw sand.....	1,450	75	1,525
Slate and sand.....	1,525	10	1,535
Sand slate and lime shells.....	1,535	50	1,585
Slate and shells and sand.....	1,585	343	1,928
Hundred-foot sand (gas at 1,947 feet; no water).....	1,928	72	2,000
Slate and shells.....	2,000	50	2,050
Thirty-foot sand.....	2,050	20	2,070
Slate.....	2,070	10	2,080
Slate, shells, and red rock.....	2,080	35	2,115
Slate.....	2,115	15	2,130
Sand, Snee and Bowlder.....	2,130	12	2,142
Slate.....	2,142	28	2,170
Gordon sand (and Stray ?).....	2,170	87	2,257
Shale.....	2,257	13	2,270
Fourth sand.....	2,270	23	2,293
Red rock.....	2,293	57	2,350
Shales and sandstone shells.....	2,350	55	2,405
Thin sandstone (trace of oil).....	2,405		
Slate and shells to bottom.....			2,943

Record of J. L. McNairy well No. 2 (No. 244), Peters Township, Washington County, Pa.

[Owned by Manufacturers Light &amp; Heat Co. Altitude, 1,050 feet.]

Stratum.	Depth to top.	Thickness.	Depth to bottom.
	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
Pittsburg coal.....	245	6	251
Dunkard sand.....	790	55	835
Gas sand.....	1,140	45	1,185
Salt sand (water at 1,240 feet).....	1,220	30	1,250
Mountain lime.....	1,355	12	1,367
Maxon sand.....	1,367	5	1,372
Big lime.....	1,372	38	1,410
Slate.....	1,410	7	1,417
Big Injun sand (show of gas at 1,521 feet).....	1,417	233	1,650
Thirty-foot sand.....	1,990	60	2,050
Gantz sand.....	2,123	30	2,153
Fifty-foot sand (show oil 2,168 feet; best sand 2,175-2,182 feet).....	2,153	29	2,182
Sand.....	2,235	20	2,255
Sand.....	2,280	20	2,300
Lower Thirty-foot sand.....	2,340	20	2,360
Stray sand.....	2,375	16	2,391
Gordon sand (gas at 2,397 feet).....	2,395	25	2,420
Fourth sand.....	2,450	13	2,463
Fifth sand (gas at 2,505 feet).....	2,492	35	2,527
Soft slate.....	2,527	173	2,700
Slate and shell (shell 2,751 feet).....	2,700	125	2,825
Total depth.....			2,860

*Record of Mary Johnston well No. 13 (No. 102), Finley Township, Allegheny County, Pa.*

[Owned by Manufacturers Light &amp; Heat Co. Altitude, 1,078 feet.]

Stratum.	Depth to top.	Thickness.	Depth to bottom.
	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
Slate.....	8	50	58
Sand.....	58	50	108
Slate.....	108	50	158
Red rock.....	158	50	208
Slate.....	208	100	308
Sand.....	308	50	358
Slate.....	358	150	508
Sand.....	508	50	558
Coal.....	558	5	563
Limestone.....	563	7	570
Slate.....	570	250	820
Salt sand.....	820	40	860
Slate.....	860	10	870
Salt sand.....	870	105	975
Big Injun sand.....	1,050	250	1,300
Slate.....	1,300	50	1,350
Squaw sand.....	1,350	40	1,390
Slate and shells.....	1,390	130	1,520
Hard shells.....	1,520	200	1,720
Slate.....	1,720	40	1,760
Red rock.....	1,760	10	1,770
Slate.....	1,770	58	1,828
Hundred-foot sand (show of oil 1,839 feet).....	1,828	19	1,847
Slate.....	1,847	5	1,852
Hundred-foot sand.....	1,852	20	1,872
Slate.....	1,872	88	1,960
Thirty-foot sand (show of oil at 1,968 feet; pay at 1,975-1,980 feet).....	1,960	21	1,981
Total depth.....			1,983

*Record of Pressed Steel Car Co. well No. 1 (No. 128), McKees Rocks Township, Allegheny County, Pa.*

[Owned by Pressed Steel Car Co. Altitude, 731 feet.]

Stratum.	Depth to top.	Thickness.	Depth to bottom.
	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
Gravel.....		68	68
Slate (water at 85 feet).....	68	22	90
Quicksand.....	90	30	120
Slate (water at 135 feet).....	120	20	140
Sand.....	140	55	195
Sand (water).....	195	25	220
Coal.....	220	3	223
Slate.....	223	87	310
Lime.....	310	20	330
Slate (water).....	330	20	350
Sand.....	350	17	367
Slate.....	367	102	469
Shells (salt water).....	469	29	498
Lime, white.....	498	24	522
Sand.....	522	3	525
Slate.....	525	35	560
Lime, red (top Big Injun sand).....	560	25	585
Sand, white (bottom Big Injun sand).....	585	105	690
Slate, black.....	690	30	720
Sand, black (top Squaw sand).....	720	30	750
Slate, white.....	750	45	795
Sand, white (bottom of Squaw sand).....	795	100	895
Slate, black.....	895	15	910
Lime, white.....	910	40	950
Sand, white (salt sand).....	950	63	1,013
Slate, black.....	1,013	82	1,095
Shells, white (water).....	1,095	155	1,250
Sand, blue (water).....	1,250	113	1,363
Slate, black (top of Hundred-foot sand).....	1,363	21	1,384
Sand, white (water).....	1,384	56	1,440
Slate, black.....	1,440	2	1,442
Sand, black (bottom of Hundred-foot sand).....	1,442	38	1,480
Slate, white.....	1,480	13	1,493
Shells, black (top of Thirty-foot sand).....	1,493	58	1,551
Sand, dark (bottom of Thirty-foot sand).....	1,551	30	1,581
Slate, red (top of Gordon sand 1,601 feet).....	1,581	22	1,603
Sand, dark (bottom of Gordon sand 1,680 feet).....	1,603	81	1,684
Fourth sand (gas).....			1,722

*Record of S. B. Phillips well No. 1, McDonald field, North Fayette Township, Allegheny County, Pa.*

[Owned by Woodland Oil Co.]

Stratum.	Depth to top.	Thickness.	Depth to bottom.
	<i>Feet.</i>	<i>Feet.</i>	<i>Feet.</i>
Unrecorded.....	0	86	86
Pittsburg coal.....	86	4	90
Fire clay.....	90	5	95
Gray sand.....	95	5	100
Limestone.....	100	19	119
Lime, shells, and slate.....	119	11	130
Gray sand.....	130	24	154
Black slate.....	154	5	159
Gray sand and slate.....	159	41	200
White slate.....	200	19	219
Red rock.....	219	39	258
White slate.....	258	7	265
Elk Lick coal and fire clay.....	265	5	270
White slate.....	270	35	305
Black slate.....	305	72	377
White slate.....	377	10	387
Gray sand, soft.....	387	72	459
Black, red, and white slate.....	459	16	475
White slate.....	475	38	513
Gray sand and slate.....	513	16	529
Black slate.....	529	12	541
Dunkard or Cow Run sand (upper Mahoning).....	541	50	591
Mahoning coal.....	591	7	598
White slate, red slate, and shells and sand.....	598	105	703
Black and white slate.....	703	61	764
Lower Freeport coal.....	764	7	771
White slate, lime, and shells.....	771	15	786
Black slate.....	786	53	839
Upper Kittanning coal and slate.....	839	7	846
Fire clay (water).....	846	6	852
Black slate and fire clay.....	852	17	869
Middle Kittanning coal.....	869	3	872
Black slate and shells.....	872	12	884
Lower Kittanning coal and slate.....	884	5	889
Black slate and shells and sand.....	889	34	923
Black sand, hard.....	923	14	937
Black sand, soft.....	937	15	952
Upper Clarion coal and black slate.....	952	5	957
Gray and black slate and shells.....	957	10	967
Lower Clarion coal and black slate.....	967	3	970
Black slate and shells.....	970	6	976
Salt sand (Pottsville).....	976	217	1,193
Black slate and sand.....	1,193	39	1,232
Big Injun sand, hard.....	1,232	237	1,469
Black and white slate, sand, and shells.....	1,469	88	1,557
Squaw sand, hard gray sand with 9 feet of black slate near middle.....	1,557	42	1,599
Black and gray shales with some sandy beds.....	1,599	201	1,800
Sand, white and blue, hard (Beret?).....	1,800	29	1,829
Gray and black shales.....	1,829	77	1,906
Red rock.....	1,906	14	1,920
Black slate and shells.....	1,920	12	1,932
Gantz sand, top of Hundred-foot; sand hard, grayish white.....	1,932	27	1,959
Slate break.....	1,959	11	1,970
Fifty-foot sand; hard, white, gray (gas and water 13 feet below top; no slaty layers).....	1,970	46	2,016
Black slate and shells.....	2,016	79	2,095
Thirty-foot sand, gray, hard (show of oil at 2,111 feet).....	2,095	25	2,120
Black slate.....	2,120	27	2,147
Stray and Gordon sands combined; little gas at 2,167 feet in upper gray portion (Stray); more gas at 2,188 feet and 2,193 feet in lower white portion (Gordon).....	2,147	63	2,210
Black slate, with a thin Stray sand.....	2,210	43	2,253
Fourth sand, gray and white, hard.....	2,253	20	2,273
Black slate and sand, hard.....	2,273	38	2,311
Fifth or McDonald sand; pay streak, oil, 19 feet below top, a gray sand.....	2,311	24	2,335
Black slate to bottom of well.....	2,335	7	2,342

### ROCKS EXPOSED AT THE SURFACE.

The rocks which outcrop in the Carnegie quadrangle are of no economic importance to oil producers, since none of them contain pools of oil or gas in paying quantities. These rocks are, however, of considerable geologic importance, since they furnish more or less accurate guides to the structure of the deeply buried oil and gas sands.



For this reason a brief discussion of the outcropping beds will be undertaken in this paper, the detailed consideration of them being more appropriately reserved for publication in the geologic folio.

#### CARBONIFEROUS SYSTEM.

##### PENNSYLVANIAN SERIES.

##### CONEMAUGH FORMATION.

The lower portion of the Conemaugh formation, including the Mahoning sandstone member (Little and Big Dunkard sands), does not come to the surface in the quadrangle and has already been mentioned in the preceding section.

*Saltsburg sandstone member.*—The Saltsburg sandstone member is a fairly persistent sandstone from 50 to 120 feet thick, the top of which is about 275 feet above the base of the Conemaugh formation. It is barely above drainage in the northern portion of the quadrangle, but is noted in many detailed records in the quadrangle farther south. This sandstone has been correlated<sup>a</sup> with the first Cow Run sand of West Virginia and Ohio, but it may be more nearly equivalent to the Hurry-up sand of that region. In the Carnegie quadrangle it is usually filled with fresh water, but farther south it contains important pools of oil and gas.

*Morgantown sandstone member (Murphy sand).*—The Morgantown sandstone member or Murphy sand is a fine-grained gray sandstone, ranging from 20 to 75 feet thick, with its top about 200 feet below the Pittsburgh coal bed. Its outcrop encircles the hillsides in the northern part of the quadrangle, but it is below drainage in the southern part. In Greene County and farther southward this bed is an important source of gas and some oil; in that region it is said also to carry considerable quantities of salt water.

Overlying the Mahoning sandstone member and extending to the base of the Pittsburgh coal are 200 feet of sandy yellowish and reddish shales, in which are embedded one or two thin beds of coal and limestone.

##### MONONGAHELA FORMATION.

The Monongahela formation, which is composed of beds of coal, shale, limestone, and sandstone, occupies the interval of 355 to 380 feet between the base of the Pittsburgh coal and the top of the Waynesburg coal. The Redstone coal is 30 to 60 feet above the bottom, the Sewickley coal near the middle, and the Uniontown coal about 100 feet from the top of the formation. Of these, the Pittsburgh and the Waynesburg are by far the most important. The others, being of little or no economic or stratigraphic value, will not be discussed in this paper. The more important members of the formation will be briefly described.

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<sup>a</sup> Ashley, G. H., Rept. Top. and Geol. Comm. Pennsylvania, 1906-1908, p. 160.

*Pittsburg coal.*—The Pittsburg coal is the thickest and by far the most important coal bed of southwestern Pennsylvania. It is found in the Carnegie quadrangle, wherever its horizon is exposed or touched by the drill, with a thickness of from 7 to 14 feet, and with 5 to 6 feet of workable coal of good quality. Aside from its great economic value, which will not be touched upon here, this bed is of great stratigraphic importance to oil operators as well as to geologists. Covering as it does a very large area in Pennsylvania, Ohio, and West Virginia, it affords an ideal geologic marker by which other beds above and below it may be recognized. It is also used as a datum plane from which the structure both of rocks at the surface and of those underground may be calculated.

*Pittsburg sandstone member.*—The Pittsburg sandstone member is a persistent bed, from 20 to 50 feet thick, with its base a few feet above the Pittsburg coal. In this bed, in the southern part of Washington and in Greene counties, Pa., drillers sometimes find small pools of gas with indications of oil in a few locations.

*Benwood limestone member.*—Near the middle of the Monongahela formation occurs the most prominent limestone bed of the Pennsylvanian series, the Benwood. By drillers this is usually designated the Big lime. It is from 75 to 100 feet thick and is composed of a number of thin white, gray, and blue limestones separated by thin beds of calcareous shale. Except as a geologic marker this bed is of no economic value to producers.

*Uniontown sandstone member.*—The Uniontown sandstone member is a thin gray or reddish sandstone overlying the Uniontown coal at about 275 to 290 feet above the Pittsburg coal. It is of no importance in the Carnegie quadrangle, but at Cairo, Ritchie County, W. Va., it is considered by I. C. White<sup>a</sup> to be equivalent to the "shallow oil sand" and to be the highest known oil sand in that State. Small quantities of gas have been reported from a sand at about this horizon in Greene and Washington counties, Pa., where it is from 500 to 1,100 feet below drainage, but no definite relative data are available.

*Waynesburg coal.*—Over most of the Carnegie quadrangle the Waynesburg coal outcrops well up toward the tops of the hills. It is thin and inconspicuous, seldom showing more than 3 or 4 feet of soft dirty coal. It is of little economic or stratigraphic importance.

#### PERMIAN SERIES.

##### DUNKARD GROUP.

*Washington formation.*—In the southern part of Washington County this formation attains a thickness of about 400 feet, extending from the top of the Waynesburg coal to the top of the Upper Washington limestone member. It consists chiefly of sandstones and shales, with several thin limestones, and five or more unimportant coal beds. In

<sup>a</sup> Geol. Survey West Virginia, vol. 1 (A), pp. 75-76.

the Carnegie quadrangle some of the highest hills and ridges carry as much as 200 feet of this formation, the upper portion having been removed by erosion. These rocks are of no value to oil and gas operators, and a detailed description of them will therefore be reserved for the folio of this quadrangle.

### **STRUCTURE.**

#### **DEFINITIONS.**

By structure is meant the shape or "lay" of the strata. Since the great mass of sedimentary rocks described above were deposited they have been slowly raised and depressed many times by broad continental movements in the earth's crust. This process has been a more or less continuous one from the time the first beds were deposited. The producer of oil and gas is not interested in the deformation processes through which the strata have passed so much as he is in the results of that deformation. The discussion of the structure of the Carnegie quadrangle will therefore be confined to the sum total of all the movements to which these beds have been subjected as represented by their present shape.

In describing structure an upward bending arch is called an anticline and a downward bending trough a syncline. The axis of a fold is a line, every point in which occupies the highest part of an anticline or the lowest part of a syncline.

#### **METHOD OF REPRESENTING STRUCTURE.**

The structure of a region may be represented on a map either by cross sections showing the dip of the beds along certain chosen lines or by the use of contour lines drawn through points of equal height at the top or bottom of some bed taken as a key rock. The first method is employed in areas where the beds are steeply folded and broken by faults; the latter is most successfully employed where the beds are but slightly disturbed from their originally horizontal position. The latter method is used to show the structure of the oil sands of the Carnegie quadrangle.

On the map (Pl. V) contour lines in green are drawn to show the shape of the upper surface of the Third or Gordon sand. These contours have a vertical interval of 10 feet, and each of them traces a level line along the slope of this sand at all points of which the top of the sand is a given height above a horizontal datum plane. For convenience, this datum is assumed to be 2,000 feet below sea level. Thus, the contour marked 800 on the map is a level line on the top of the sand, all points on which line are supposed to be 800 feet above the datum plane 2,000 feet below sea level. In like manner the 1,000-foot contour marks all points at the top of the sand which are 1,000 feet above the same datum plane, and along this line the sand is therefore 1,000 feet below sea level.

## ACCURACY OF STRUCTURE CONTOURS.

The accuracy with which the structure contours on a given bed represent the shape of that bed depends of course upon the number and position of the points on this key horizon at which the exact height of the bed has been secured, and also to a less extent upon the skill employed in interpreting the shape of the bed from these data.

The contours on the Third or Gordon sand shown in Plate V vary greatly in accuracy from point to point because of the difference in the amount and quality of the information upon which they were based.

*Material employed.*—The data used in the construction of the contour map of the Gordon sand, which lies from 2,000 to 3,000 feet below the surface, were spirit-level lines run to the mouths of most of the wells and measurements from the mouth of each well to the top of the Gordon sand. The levels were run by the writer and his assistants. The measurements were secured from records of the wells obtained from owners. In this way the altitudes of hundreds of points on the top of the Gordon sand were determined within a possible limit of error of 5 feet. In the well-developed fields this material was sufficiently plentiful to assure the fairly accurate location of the contours. In areas where few wells have been drilled, the positive elevations obtained on the Gordon sand were too widely scattered to admit of more than a very general delineation of the structure. To increase the accuracy of the contours between these isolated points, a contour map of the Pittsburg coal, which shows at the surface, was carefully prepared.<sup>a</sup> By superimposing the map of the Gordon sand on this map and drawing the contours of the sand to correspond with those on the coal in places where the material is scanty for the oil sand, a fairly accurate structural map of the oil sand was secured.

A contour map of the oil sand thus prepared is not accurate in detail, since the two beds seldom if ever lie parallel to each other over even a single square mile. To eliminate this source of error, the writer has heretofore resorted to the use of what is known as a convergence sheet by which the approximate distance between the two key horizons may be estimated at all points. By thus inserting the correction for convergence of the strata the contours on the surface bed may be so altered in places as to make them correspond more closely to the surface of the underground bed. Such corrections, however, are of greatest value in areas where the variation in distance between the key horizons is fairly uniform over considerable areas. If the variation is irregular, a convergence sheet is of little value unless a large number of measurements between the two key

<sup>a</sup> The structural map of the Pittsburg coal was made by G. C. Martin in connection with work for a folio of this quadrangle.

horizons are available. In such cases, only the general structural features of the oil sand can be determined. Such a condition probably exists in the Carnegie quadrangle. Here the Pittsburgh coal

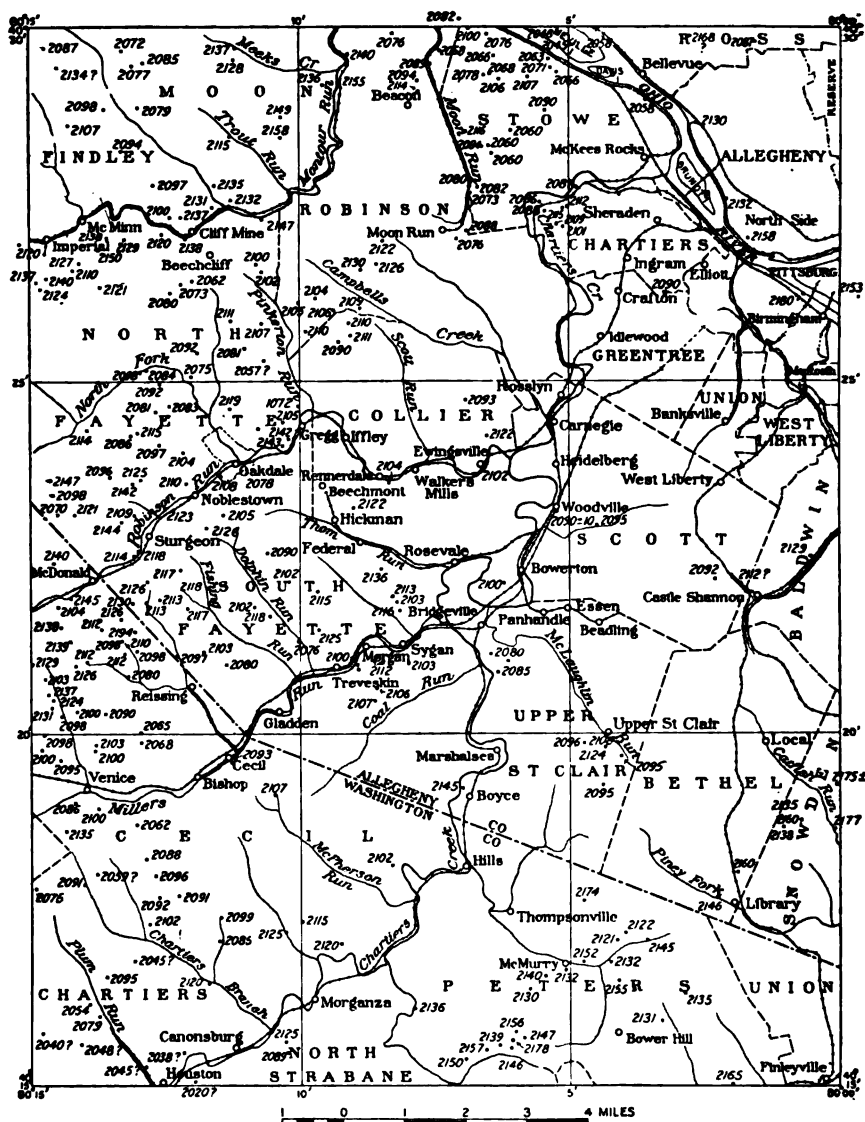


FIGURE 1.—Sketch map of the Carnegie quadrangle showing the distance in feet between the top of the Pittsburgh coal and the top of the Gordon sand. The variation in this interval is probably due, in large part, to the unconformity at the base of the Pottsville formation.

appears to have been deposited on an irregular surface, portions of which had been previously subjected to erosion, thus introducing sharp local changes in distance between it and the Gordon sand (see

fig. 1), which materially decrease the possibility of securing from it accurate contours on the oil sand. Because of this difficulty the convergence sheet of this quadrangle has been employed only in a very limited way, and in areas where no wells occur the contours on the Gordon sand are generalized to show only the principal structural features.

#### STRUCTURAL FEATURES OF THE GORDON SAND.

From the contours shown on Plate IV (in pocket) it will be seen that in the Carnegie quadrangle and in the region surrounding it the rocks which originally lay in practically horizontal beds have been slightly tilted as a whole southeast and south, and they have also been wrinkled into irregular folds having a general northeast-southwest to north-south trend.

*Nineveh syncline.*—The most prominent and well-defined fold in the Carnegie quadrangle (see Pl. V, in pocket) is a broad flat-bottomed syncline which extends from the southern border in the eastern part of North Strabane Township in a north-northeast direction to the vicinity of Pittsburgh. This appears to be the northern extension of the Nineveh syncline of Washington and Greene counties. East and southeast of this trough the rocks rise irregularly to the axis of the Amity anticline; northwest from it the beds have been wrinkled into a large number of short crooked troughs and low arches having a general north-south trend. The tendency to develop a system of northeast-southwest folds is hardly perceptible in this part of the quadrangle, the folding apparently being secondary to the Nineveh syncline. The bottom of this trough is not horizontal; but rises rapidly; toward the north, the comparatively uniform pitch of the fold being interrupted in two places by small oval-shaped basins. The center of the deepest of these basins, and structurally the lowest point in the quadrangle, is near the junction of Chartiers and Little Chartiers Creeks, about  $2\frac{1}{2}$  miles northeast of Canonsburg. The top of the Gordon sand in the center of this basin is about 650 feet lower than it is near the northeast corner of the quadrangle, which is structurally the highest place in the area. The next basin to the north in this trough at Woodville near the center of the quadrangle is about 150 feet above the first. From this basin the axis of the syncline rises steadily northward to the junction of Allegheny and Monongahela Rivers in Pittsburgh, where it is about 190 feet higher. Northeast of this point no data relative to the structure of the Gordon sand were obtained. The strongest dips in the Gordon sand appear to occur in that vicinity and along the western limb of this syncline from Pittsburgh to Canonsburg. At the latter point the beds rise toward the west at the rate of about 225 feet to the mile, an unusually steep dip for this region.

*Amity anticline.*—The Amity anticline is a well-defined arch which extends across the Amity quadrangle, with a general northeast-southwest trend, and crosses the southeast corner of the Carnegie quadrangle. In the Carnegie quadrangle the highest point of the Gordon sand on this anticline is about 340 feet above the lowest point in the Nineveh syncline and about 150 feet above the adjacent trough of the McMurry syncline.

*McMurry syncline.*—The name McMurry syncline is locally applied to a secondary trough which branches off from the Nineveh syncline northwest of McMurry. For the first 3 miles from the Nineveh syncline this trough has a general trend east, then it gradually swings northeastward, leaving the eastern border of the quadrangle about  $4\frac{1}{2}$  miles from the southeast corner. Owing to the scarcity of positive elevations on the Gordon sand along the probable course of this trough and farther north, its exact position could not be determined, nor is the writer at all certain that the structural features shown by the contours between this trough and Castle Shannon are as represented. This is also true of the area lying north of Upper St. Clair and east of Bridgeville and Woodville.

*Cross Creek syncline.*—The Cross Creek syncline was first named by Griswold.<sup>a</sup> It is a canoe-shaped basin in the central part of the Burgettstown quadrangle, which adjoins the Carnegie quadrangle on the west. This trough has an east-west trend, and toward the east it rises to a low divide near the boundary between the two quadrangles, from which it deepens and widens to the basin in the Nineveh syncline, 2 miles northeast of Canonsburg.

*Washington anticline.*—The fold that has been called the Washington anticline is one of the most important structural features of the Claysville quadrangle, which joins the Carnegie quadrangle on the southwest. It crosses the northwest corner of the Amity quadrangle, entering the Carnegie quadrangle from the south about 1 mile from the southwest corner. From this point the fold appears to die out very abruptly against the Cross Creek syncline. It seems possible, however, that this arch may swing sharply northwest across the southwest corner of the quadrangle and unite with the Claysville anticline off the western border of the quadrangle in the vicinity of the Westland Dome, south of Hickory.

*Wildwood anticline.*—North of the Cross Creek syncline and west of the Nineveh syncline the rocks are wrinkled into a large number of small shallow troughs which die out north and northwest. The most prominent fold that can be detected in the rocks of this portion of the quadrangle appears to be the southern extension of the Wildwood anticline, a clearly defined fold which crosses the Sewickley quad-

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<sup>a</sup> Bull. U. S. Geol. Survey No. 318, 1907.

range on the north with a northeast-southwest trend, and enters the northern border of the Carnegie quadrangle a little west of its middle point. From this point the fold dies out rapidly toward the south and is barely traceable as a low sinuous arch to the vicinity of •Oakdale, where it disappears in the irregular wrinkling referred to above.

*Mount Nebo syncline.*—On the Sewickley quadrangle the Mount Nebo syncline is the first trough west of the Wildwood anticline. Near the southern border of that quadrangle this trough unites with the Sewickley syncline on the west. Southward this trough enters the Carnegie about 1 mile northwest of Ewing's Mill and roughly parallels the Wildwood anticline to the vicinity of McDonald, where it appears to bend abruptly west for about a mile, thence southward in a narrow shallow trough, uniting with the Cross Creek syncline about 1 mile east of Venice. Northwest of this fold the rocks rise slowly and irregularly to the corner of the quadrangle.

#### OIL AND GAS POOLS OF CARNEGIE QUADRANGLE.

##### CHARTIERS TOWNSHIP, WASHINGTON COUNTY.

A portion of Chartiers Township is included in the southwestern corner of the Carnegie quadrangle. With the exception of a narrow belt along Chartiers Creek at Canonsburg, no oil has yet been found in paying quantity in this portion of the township, though almost the entire area is gas producing. The gas comes from the Fifth, the Fourth, the Third or Gordon, the Third Stray or Gordon Stray, the Fifty-foot, the Gantz, and the Murrys ville sands, the largest pools probably being found in the Fifty-foot and the Fourth sands. This gas area is the eastern part of the great gas field lying in Chartiers, Mount Pleasant, Hopewell, Canton, and Buffalo townships, Washington County, which has been furnishing Pittsburg with a large volume of gas for more than 20 years. This portion of the township, however, is situated, structurally, on the eastern slope of a large dome on the Claysville and Washington anticline, the crest of which lies south of Hickory in Mount Pleasant Township. The eastern dip of the rocks across this township is above the average for this region, the maximum in a few places being probably as much as 225 feet to the mile. The closed pressure and capacity of the gas wells appear to bear no direct relation to the geologic structure, though reliable information regarding these phenomena is too meager to justify a definite statement. Most of these wells have been drilled for a number of years and the gas is now greatly depleted.



The following well records are typical of the better ones obtained in the township. The locations of these wells are indicated by the corresponding map numbers on Plate IV.

*Partial records of deep wells in Chartiers Township, Washington County, Pa.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Total depth of well.	Remarks.
1	J. C. McNary....	Manufacturers Light & Heat Co.	Feet. 1,175	Pittsburg coal... Gantz sand..... Fifty-foot sand... Gordon Stray.... Gordon sand..... Fourth sand..... Fifth sand.....	Feet. 60 1,885 1,910 2,074 2,125 2,174 2,230	Feet. ..... ..... ..... ..... ..... ..... .....	Feet. 2,410	
2	T. Thompson....	Philadelphia Co.	1,212	Pittsburg coal... Salt sand..... Big Injun sand... Thirty-foot sand... Gantz sand..... Fifty-foot sand... Gordon sand..... Hundred-foot sand.	205 1,070 1,317 1,870 2,000 2,030 2,300 2,380	80 230 50 15 56 40 20	2,451	
3	J. R. Campbell.....do.....	.....do.....	1,149	Gordon Stray... Gordon sand..... Hickory sand..... Hundred-foot sand.	2,200 2,235 2,300 2,340	30 25 15 20	2,389	
4	J. B. Little.....do.....	.....do.....	997	Gantz sand..... Fifty-foot sand... Stray sand..... Gordon sand..... "Hickory" sand	1,746 1,780 1,965 2,020 2,070	16 77 55 30 22	2,090	Gas at 1,752 and 1,763 feet.
5	.....do.....do.....	.....do.....	1,023	Thirty-foot sand Gantz sand..... Fifty-foot sand... Stray sand..... Gordon sand.....	1,648 1,786 1,816 1,992 2,040	25 24 32 48 20		Good gas at 2,083 feet. Gas in Stray and Gordon sands.
6	R. D. Scott.....do.....	.....do.....	1,114	Big Injun sand... Gantz sand..... Fifty-foot sand... Gordon sand..... Fourth sand.....	1,335 2,057 2,080 2,290 2,419	40 5 25 30 10	2,502	Little gas on top Fifty-foot sand.
30	Alexander, No. 1	Canonsburg Steel & Iron Works.	1,020	Gas..... Salt sand..... Gas sand..... do..... Fifty-foot..... Gordon Stray.... Bottom Gordon.. Fourth sand..... Fifth sand.....	754 950 1,211 1,802 1,850 2,035 2,095 2,123 2,131	..... ..... ..... ..... 56 ..... ..... 20 59		Gas in Fifty-foot sand from 1,854 to 1,864 feet.
31	T. H. Sharp, No. 1.	.....do.....	978	Pittsburg coal... Gas sand..... Salt sand..... Big Injun sand... Thirty-foot (shells). Gantz sand..... Fifty-foot sand... Gordon Stray.... Gordon sand..... Fifth sand.....	135 900 1,085 1,275 1,800 1,960 2,005 2,190 2,217 2,355	..... 20 90 215 100 35 40 25 23 10		Gas in Fifty sand at 2,360 feet.

From these records it will be seen that the nomenclature of the drillers is by no means uniform. From such material alone it would be very difficult to trace with certainty a gas-bearing sand from one portion of the quadrangle to another, and in many places the stratigraphic facts when taken collectively are not sufficient to justify positive identifications. A close examination of the well sections of Plates II and III will show more clearly the uncertainty of close correlation in this township.

Comparatively few records were obtained of wells in this township, hence the structural contours of the Third or Gordon sand are based largely on those of the surface rocks, and are therefore doubtless more or less inaccurate in smaller details.

#### CECIL TOWNSHIP, WASHINGTON COUNTY.

Cecil Township lies northeast of Chartiers Township, and extends northwest from Chartiers Creek along the county line to McDonald and west beyond the border of the quadrangle. It is one of the greatest oil-producing townships of Washington County. The McDonald and Venice fields cover the northern portion of this area, and from the Cecil and Mawhinney pools and the Canonsburg field large quantities of oil have been obtained.

*Canonsburg oil and gas field.*—In the Canonsburg field the Fifth sand is found to be oil bearing in all of the productive area with the possible exception of a portion of the field immediately northeast of Canonsburg, where in places the sand is said to be absent. This sand is especially productive on the Patton, Reed, Moore, Weaver, and White farms, as well as on a number of other farms in the western portion of the field. At several places in this field the Gordon Stray or the Gordon sand is very productive.

Considerable trouble has been experienced by drillers in distinguishing in this locality between the Gordon and the Gordon Stray sands, since they often seem to unite into a single sandstone. At some places there is apparently no "break" between them, but at other places these sands are separated by several feet of shale. From all available evidence on this point the writer is inclined to consider the entire sandstone where no "break" occurs as being more nearly equivalent to the true Gordon sand, and that the Gordon Stray is variable in thickness from place to place. In this field the average distance from the top of the Pittsburg coal to the top of the true Gordon sand is about 2,100 feet, with a maximum variation of about 20 feet from the average.

The following typical logs of wells show clearly the difficulty of arriving at a satisfactory solution of this problem from imperfect well records:

*Partial records of deep wells in Canonsburg field, Cecil Township, Washington County, Pa.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
			<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>	
47	B. Conners No. 3.	Manufacturers Light & Heat Co.	1,012 ±10	Pittsburg coal...	134	6	
				Murphy sand...	315	40	
				Sand...	505	25	
				Hurry-up sand...	550	10	
				Coal...	705	5	
				do...	800	5	
				Sand...	860	15	
				do...	900	5	
				do...	1,000	50	Water at 1,000 feet; Salt or Gas sand.
				Salt sand...	1,075	85	
				Sand...	1,170	20	
				do...	1,225	10	
				Coal...	1,235	5	
				Big Injun sand...	1,296	184	
				Squaw sand...	1,540	20	
				Sand...	1,600	15	
				Thirty-foot sand...	1,815	70	
				Gantz sand...	1,972	22	
				Fifty-foot sand...	2,007	60	Gas at 2,008 feet.
				Butler Thirty-foot sand...	2,125	25	
				Stray sand...	2,185	38	
				Gordon...	2,225	33	Oil at 2,237 feet; slate break at 2,287-2,291 feet; oil at 2,347 feet.
				Fourth sand...	2,280	14	
				Fifth sand...	2,343	16	
7	C. Carter.....	J. W. Conrad & Co.	1,085	Pittsburg coal...	225	6	Total depth of well 2,500 feet.
				Salt sand...	1,180	120	Salt water rose to 150 feet of top.
				Gantz sand...	2,089	35	
				Fifty-foot sand...	2,124	50	
				Thirty-foot sand...	2,305	.....	Slate and shells.
				Gordon Stray...	2,354	13	Runs into Gordon.
				Gordon sand (?)...	2,395	20	
				Fourth sand...	2,458	14	Mostly slate and shells.
				Fifth sand...	2,458	14	6 feet sand at top; rest slate and shells.
8	White.....	W. F. Borchers.	1,110	Pittsburg coal...	220	.....	Bottom Big Injun, 1,560 feet.
				Gordon Stray...	2,270	43	First gas Fifty-foot sand at 2,140 feet.
				Fifth sand...	2,428	16	First oil at 2,297 feet; second oil and water at 2,311 feet; best sand about 2,434 feet; total depth, 2,448 feet.
9	S. H. White.....	do.....	1,035	Pittsburg coal...	225	.....	Total depth of well, 2,462 feet.
				Gordon Stray...	2,297	.....	First oil at 2,221 feet; water at 2,357 feet.
				Fourth sand...	.....	12	Bottom Gordon sand 2,347 feet.
				Fifth sand...	2,437	14	Nice pebbles.
10	Reed.....	South Penn Oil Co.	1,205	Pittsburg coal...	354	.....	Total depth of well, 2,591 feet.
				Gordon sand...	2,415	30	Oil at 2,514 feet.
				Fourth sand...	2,508	12	Oil at 2,568 feet.
				Fifth sand...	2,563	11	
11	do.....	do.....	1,208	Pittsburg coal...	320	.....	Total depth of well, 2,589 feet.
				Gordon Stray (?)...	2,416	30	Oil at 2,422 feet.
				Fifth sand...	2,557	15	Oil at 2,563 feet.
12	Morganza No. 6.	W. F. Borchers.	960	Fifty-foot sand...	2,075	.....	Oil 5 feet below top,
				Gordon sand...	2,295	21	
				Fifth sand...	2,399	12	

*Partial record of deep wells in Canonsburg field, Cecil Township, Washington County, Pa.—Continued.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
13	W. T. Denny No. 1.	W. F. Botchers.	Feet. 1,077	Pittsburg coal...	Feet. 195	Feet.	Total depth of well, 2,416 feet. Oil near top (2,251 feet). Little oil; hard sand above.
				Gordon Stray...			
				Gordon sand...	2,300		
				Fifth sand...	2,400	6	
14	R. D. Scott....	South Penn Oil Co.	1,296	Pittsburg coal...	410		Total depth of well, 2,624 feet.
				Fourth sand...	2,528	15	
				Fifth sand...	2,593	16	
15	J. M. White No. 1.	Miller & Abraham, McDonald, Pa.	1,097	Gordon sand...	2,210	66	Gordon and Gordon Stray sands, together without break.
				Fourth sand...	2,306	34	
				Fifth sand...	2,403	9	
22	J. W. Howell No. 2.	South Penn Oil Co.	1,197	Pittsburg coal...	326		Total depth of well, 2,573 feet. Oil at 2,206 feet.
				Fifty-foot sand...	2,203		
				Gordon sand...	2,380		
				Fourth sand...	2,475		
				Fifth sand...	2,536	8	

The Hundred-foot sand, consisting of the Gantz and the Fifty-foot, also furnishes a considerable amount of both oil and gas. The production from these sands appears to come from several small pools which seem to be entirely cut off from one another. These have been most productive in the eastern part of the field, where some wells furnish oil from as many as three pay streaks in the Hundred-foot sand.

In the Canonsburg field the Fourth sand, where productive, is oftener gas bearing, though it has furnished oil in several good wells. Going north from the center of this field the percentage of oil wells in this sand gradually increases until in the Venice field it is the principal oil producing sand. Gas is also reported in a few wells from the Salt or Gas sand, which is equivalent to one or more of the Pottsville sandstones. These sands, together with the Big Injun sand below them, are the principal source of salt water within the field. This water is found in varying quantities and head from well to well. One well may fill up a thousand feet with water when drilled into one of these sands, while the water in another well, only a few hundred yards away, may show only a few feet of head. Of the oil-bearing beds, the Fifty-foot sand probably contains the most water, though the Gordon Stray and the Gordon sands have furnished small quantities of water in a number of wells. The Fourth and the Fifth sands afford no water. From the incomplete information in hand it seems that the generally recognized water conditions in the Hundred-foot and the Gordon sands hold in this field. The remarkable difference between the behavior of the salt water in these sands lies in the fact that salt water in the Hundred-foot sand tends to assist

production and to extend the life of a well, whereas water in the Gordon sand retards production and materially shortens the time a well will continue to produce. In the first case the water is exhausted with the oil; in the second, the salt water usually increases with pumping, and generally results in a corresponding decrease in the oil until finally the well furnishes salt water exclusively. These characteristics are very pronounced in the fields farther north, in Beaver, Allegheny, and Butler counties.<sup>a</sup>

Although the maximum production from this field was great, few wells made phenomenal flows, and only a small percentage of them had an initial production of more than 200 barrels per day. Though the field long ago reached "settled" production, the wells show good staying qualities, and many of them will doubtless be pumped many years before becoming exhausted.

*Mawhinney oil pool.*—The Mawhinney oil pool was opened in 1895 on the James Mawhinney and P. S. Walker farms, situated about 1 mile south of Cecil. The oil was found congested into a small pool of high pressure in the Fifty-foot sand. With a few exceptions the wells had a comparatively large initial production and decreased rapidly until exhausted. Only a small number of the wells that have produced oil in this pool are shown on the map (Pl. IV); the others have long since been abandoned and all indications of their locations obliterated. The largest well in the pool was the James Mawhinney No. 2, a record of which is given below. This well when drilled 5 feet into the Fifty-foot sand began flowing oil through a 6-inch hole over 2,250 feet deep at the rate of 160 barrels per hour. In May, 1908, several barrels per day were still being pumped from this well. At that date but two other wells in the pool were producing; these were the James Mawhinney No. 4 and the P. S. Walker No. 5, which together yielded only 2 or 3 barrels per day. In the following records of these three wells attention is called to the variation in depth below the top of the sand at which the oil was found from west to east across the pool.

*Partial records of three wells in Mawhinney pool, Cecil Township, Washington County, Pa.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
16	James Mawhinney No. 2.	South Penn Oil Co.	<i>Feet.</i> 1,180	Pittsburg coal... Fifty-foot sand..	<i>Feet.</i> 355 2,252	<i>Feet.</i> ..... 15	Oil at 2,257 feet flowed 160 barrels per hour.
17	James Mawhinney No. 4.	.....do.....	.....	Pittsburg coal... Fifty-foot sand..	355 2,247	..... .....	At 1,219 feet. Salt sand, water; at 1,400 feet. Big Injun; oil at 2,262 feet, 15 barrels per hour.
18	P. S. Walker No. 5.	.....do.....	1,208	.....do.....	2,275	55	Total depth well, 2,337 feet; oil at 2,289 feet.

<sup>a</sup> See oil and gas bulletin of Sewickley quadrangle, published by Top. and Geol. Survey Commission, Pennsylvania.

From these records it will be seen that in well No. 16 the greatest volume of the oil was obtained when the well had penetrated the sand to a depth of only 5 feet, in well No. 17 the maximum flow occurred 15 feet below the top, and in well No. 18 the oil was found after drilling 14 feet in the sand. Little or no water was found in the Hundred-foot sand in this pool.

*Cecil oil pool.*—In its prime the Cecil oil pool contained more than 100 producing wells. All of these are now abandoned with the single exception of the August Behling No. 1 well (No. 19), from which a small quantity of oil is still pumped. Little information relative to this pool was secured in the field. It was opened during the excitement following the drilling of the Mawhinney gushers in 1895. Many wells with good initial flows were drilled, and it was generally thought to be a very promising pool. The production of the wells ran down very rapidly, however, and soon ceased. The oil came entirely from the Fifty-foot sand and is said to have been accompanied by varying amounts of salt water. With the exception of the Behling No. 1 well, no records of wells were secured, and only a few of the old holes are located on the map.

*Venice oil field.*—Oil has been produced in the Venice field since about 1894. The first wells in this field were mainly gas producers from the Fifty-foot sand, though some oil was also found in the same sand. When these wells were deepened to the Fourth sand many of them began producing oil in large quantities. The best well had an initial flow of as much as 100 barrels per hour. The oil comes mainly from the Fourth sand, though an occasional well in the southern part of the field found oil in the Fifth and the Gordon sands. There is a marked increase of oil in the Gordon sand north from Venice. In that direction there is no line of demarcation between the Venice and the McDonald pools, the decrease in the number of Fourth sand wells being as gradual as the increase of oil in the Gordon sand. The production of the wells now range from a fraction of a barrel to a few barrels a day, and many once good oil wells have been exhausted and abandoned.

In this field the Fourth sand shows no salt water. In a few wells small quantities of water have been pumped from the Gordon sand, but at no place does the water appear seriously to affect the flow of oil into wells.

Oil in the Fifth sand of the Canonsburg field appears to pinch out a mile or more south of Venice, and this point is assumed to mark the southern edge of the Venice field. In the same way the northern edge may be assumed to be marked by the disappearance of oil in the Fourth sand. The Gordon pool, however, in that field extends northeast almost unbrokenly to the Moon Run field, a distance of about 9 miles, and embraces the major portion of the famous McDonald field.

The stratigraphy of the oil sands in the Venice field does not differ materially from that of the Canonsburg field already described. Some variations of importance occur in the porosity of the oil sands, which, because of lack of data, can not be described in detail. It is generally recognized, however, that northward from the Canonsburg field the Fifth sand, though probably considerably thinner in places, is almost, if not always, found in wells drilled to it and is therefore very probably a continuous bed. Its greatest change is probably in quality. In the Canonsburg pool, where the bed is very productive, the pay streak consists of from one to several feet of quartz-pebble conglomerate very open and porous. Traced northward this conglomeratic layer appears to change into a coarse sandstone, which is finer grained at the edge of the pool. What is said of the varying porosity of the Fifth sand is to a greater or less extent true of the other oil-bearing beds, though some of them are not conglomeratic. The productive portions are always found to be softer and apparently more porous than the part not saturated with oil, but at places good pay streaks are reported which contain no oil, gas, or water. The following typical records of wells in this field serve to show changes in thickness of the more important oil sands.

*Partial records of deep wells in the Venice field, Cecil Township, Washington County, Pa.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
			<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>	
43	Annie Scott No. 1.	South Penn Oil Co.	1,038	Pittsburg coal...	180	.....	Total depth of well, 2,434 feet.
				Fifty-foot sand...	2,060	.....	
				Gordon sand.....	2,280	20	
				Fourth sand.....	2,338	10	
				Fifth sand.....	2,403	16	
20	James Patterson No. 2.	.....do.....	1,272	Pittsburg coal...	375	.....	Oil at 2,510 feet; flow, 134 barrels first 24 hours.
				Gordon sand.....	2,430	25	
				Fourth sand.....	2,505	20	
21	J. G. Moore No. 8.	.....do.....		Pittsburg coal...	281	.....	Depth of well, 2,437 feet.
				Fifty-foot sand...	2,181	.....	Gas.
				Gordon sand.....	2,375	30	Oil at 2,416 feet.
				Fourth sand.....	2,413	15	
22	May No. 1.....	.....do.....	1,177	Pittsburg coal...	272	8	Oil at 2,160 feet.
				Fifty-foot sand...	2,155	33	
				Gordon sand.....	2,358	20	
				Fourth sand.....	2,416	12	
23	W. M. Patterson No. 1.	.....do.....	1,161	Pittsburg coal...	240	7	Gas at 2,141 feet.
				Fifty-foot sand...	2,123	.....	
				Gordon sand.....	2,340	18	
				Fourth sand.....	2,393	18	
24	J. A. Little No. 8.	.....do.....	1,160	Pittsburg coal...	230	6	Depth of well, 2,406 feet.
				Gordon sand.....	2,325	50	Water in Gordon sand.
				Fourth sand.....	2,383	14	
25	Anna Scott No. 5.	.....do.....	1,186	Pittsburg coal...	252	.....	Depth of well, 2,433 feet.
				Gordon Stray...	2,324	14	Salt water at 1,165-1,200 feet; oil at 2,326 feet.
				Fourth sand.....	2,412	12	
26	Little No. 10.....	.....do.....	1,134	Fifty-foot sand...	2,115	.....	Oil. Depth of well, 2,398 feet.
				Fourth sand.....	2,356	18	Oil at 2,360 feet; production, 50 barrels first 24 hours.
				Pittsburg coal...	200	.....	

*Partial records of deep wells in the Venice field, Cecil Township, Washington County, Pa.—Continued.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
27	Little No. 6....	South Penn Oil Co.	<i>Feet.</i> 1,114	Pittsburg coal... Fifty-foot sand... Gordon sand.... Fourth sand.....	<i>Feet.</i> 240 2,143 2,338 2,394	<i>Feet.</i> 8 45 17 15	Depth of well, 2,411 feet. Water at 2,348 feet. Oil at 2,396 feet.
28	Kelso Bros. No. 4.	.....do.....	1,167	Pittsburg coal... Gordon sand.... Fourth sand.....  Fifth sand.....	318 2,386 2,471  2,534	..... 50 18  11	Depth of well, 2,565 feet. Poor; show of oil in Fourth sand. Well dry of water.
29	Kelso No. 5....	.....do.....	1,202	Pittsburg coal... Fourth sand....  Fifth sand.....	270 2,420  2,490	..... 16  10	Light show of oil at 2,430 feet. Gas at 2,497 feet.

*McDonald oil field.*—In point of productiveness the McDonald oil field is one of the greatest of southwestern Pennsylvania, and it may well be classed as one of the great fields of the Appalachian region. Development work in this pool was started probably as early as the year 1890, but active work was not begun until the spring of 1891, when several fairly good wells were secured within the corporation limits of McDonald. These wells were first sunk to the Gordon sand, which flowed oil in some of the best wells at the rate of 100 barrels per hour. When these wells were deepened to the Fifth sand the flow was greatly increased. The excitement which followed was intense. Hundreds of wells were sunk within a few months, and drilling continued at top speed for more than a year. The production in this field rose from a few barrels per day in March, 1891, to a maximum of more than 83,000 barrels per day in November of the same year.

Only a part of the southern end of this field lies in Cecil Township, the principal part being in North Fayette, South Fayette, Collier, and Robinson townships. This field was developed from several foci, and different parts of it were given names while being developed. These pools apparently form a continuous belt of oil, with perhaps a few narrow breaks, from Canonsburg to beyond Ohio River at Neville Island. These names will be used in this report, and the name McDonald applied to only that portion of the field which was developed or outlined shortly after the great excitement of 1891.

In that portion of the field situated in Cecil Township the principal part of the oil has been obtained from the Gordon sand, though the Fifth sand has furnished a large amount from the vicinity of McDonald, and some oil with considerable gas has been found in the Fifty-foot sand. Although a number of these wells have produced more than 1,000 barrels per day from the Gordon sand, many of them have produced from the same sand less than 50 barrels per day at their best. The total production from the Gordon sand is, however very



great, since most of the wells after 18 years of constant pumping are still yielding from 1 to 10 barrels per day.

A few records, which are fairly typical of a large number of the wells in this portion of the McDonald field, are given as follows:

*Partial records of deep wells in the McDonald field, in Cecil Township, Washington County, Pa.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
			<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>	
33	Little No. 2....	South Penn Oil Co.	1,134	Pittsburg coal....	100	7	Depth of well, 2,358 feet.
				Fifty-foot sand....	2,060	35	
				Gordon sand.....	2,284	27	Oil at 2,288 feet.
				Fourth sand.....	2,348	10	Oil at 2,352 feet.
34	Robins No. 2.....	do	1,174	Salt sand.....	1,108	175	Depth of well, 2,394 feet.
				Big Injun sand..	1,340	130	Slate and shells for 55 feet.
				Squaw sand.....	1,525	100	
				Fifty-foot sand....	2,000	60	
				Hundred-foot sand.	2,140	60	
				Gordon Stray....	2,332	15	(Gordon sand?).
				Gordon sand.....	2,306	21	(Fourth sand?).
35	Robins No. 8.....	do	1,121	Fifty-foot sand....	2,037	41	Gas at 2,057 feet; depth of well, 2,412 feet.
				Gordon sand.....	2,200	25	
				Fifth sand.....	2,381	19	Salt water at 1,132 feet.
				Pittsburg coal....	135		
36	Robins No. 6.....	do	1,185	do	200		Depth of well, 2,483 feet.
				Fifty-foot sand....	2,155		Gas at 2,165 feet.
				Gordon sand.....	2,329		Oil at 2,329 feet; output, 16 barrels first 24 hours.
				Fourth sand.....	2,386	5	
37	W. B. Morehead No. 4.	do	1,266	Pittsburg coal....	196	8	Depth of well, 2,358 feet.
				Fifty-foot sand....	2,120	45	
				Gordon Stray....	2,300	18	
				Gordon sand.....	2,322	19	Oil in bottom.
38	do	do	1,308	do	2,439	17	Gas at 2,441 feet.
39	N. G. Cook No. 4.	do	1,122	Pittsburg coal....	110		Salt water at 1,035 feet.
				Gordon sand.....	2,223	44	Oil at 2,235 feet; gas at 2,065 feet in Fifty-foot sand?
							Depth of well, 2,275 feet; best pay at 2,340-2,348 feet.
40	R. C. Brown No. 2.	do	1,134	Pittsburg coal....	153		
				Fifty-foot sand....	2,066		
				Gordon sand.....	2,251	37	Oil at 2,269 feet.
				Fifth sand.....	2,393	21	Oil at 2,395 feet.
41	G. H. Miller No. 6.	do	1,225	Pittsburg coal....	210		Depth of well, 2,482 feet.
				Gordon sand.....	2,322		Salt water at 1,145 feet; oil at 2,327 and 2,337 feet, also at 2,464 feet.
				Fifth sand.....	2,454	20	
42	McDonald Heirs No. 10.	do		Pittsburg coal....	266		
				Hurry-up sand....	630	40	
				Salt sand.....	1,135	45	
				Hundred-foot sand.	2,180	40	
				Gordon sand.....	2,403	25	Oil at 2,415 feet (Fifth sand?).
44	N. G. Cook No. 7.	do		Pittsburg coal....	245		Depth of well, 2,435 feet; salt water at 1,265 feet; oil at 2,344 feet.
				Gordon Stray....	2,337	18	
				Gordon sand.....	2,357	25	Fourth sand?
				Fourth sand.....	2,414	10	Fifth sand?

*Partial records of deep wells in the McDonald field, in Cecil Township, Washington County, Pa.—Continued.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
45	McDonald Heirs No. 12.	South Penn Oil Co.	<i>Feet.</i>	Pittsburg coal... Hurry-up sand... Salt sand... Gordon sand... Fifth sand...	<i>Feet.</i> 180 625 1,065 2,318 2,437	<i>Feet.</i> 50 22 16	Depth of well, 2,459 feet.
46	Ed. McDonald No. 21.	.....do.....	1,132	Pittsburg coal...  Gordon sand... Fifth sand...	60  2,200 2,325	23 17	Depth of well, 2,355 feet; salt water at 410 feet; oil at 2,223 feet. Oil at 2,235 feet.

From these records it will be seen that the Gordon sand in this portion of Cecil Township has a thickness ranging from 15 to 44 feet, with an average of about 25 feet. The Fifth sand is thinner, ranging from 10 to 25 feet, with an average of about 16 feet. It will also be seen that oil was found in the sands at various distances from the top, with a general average of 12 feet and 8 feet, respectively, for the Gordon and the Fifth sands. These records to some extent also reveal the fact that these sands thicken northward from the southern edge of the field. A somewhat unusual condition is revealed by the records of Nos. 37 and 38. The former is an oil well in the Gordon sand and the latter is shown to be a gas well in the same sand at a lower level.

This discussion of the McDonald oil field will be continued under North Fayette and South Fayette townships, Allegheny County.

#### NORTH FAYETTE AND SOUTH FAYETTE TOWNSHIPS, ALLEGHENY COUNTY.

*McDonald oil field.*—The center of the McDonald oil field is near the border line between North Fayette and South Fayette townships in the vicinity of McDonald. The area of greatest production was probably on a line extending northeast from McDonald, and included the Mathews, Gamble, Mevey, McMurry, Robb, Sturgeon, and Elliott farms, as well as a number of others in that vicinity. It was the production from a number of large wells on these farms that ran the daily output of the McDonald field up to a maximum of about 83,000 barrels per day on November 5, 1891. A single well on the Mathews farm is said to have reached a maximum flow of 730 barrels per hour, and is said to have been yielding 15 barrels per day in 1907, after producing a total of more than 2,000,000 barrels. Another well on the Mevey farm flowed more than 100,000 barrels in 11 days. A large number of wells in this vicinity came in at more than 200 barrels per hour. During the months of October and November, 1891,

this field produced more than 3,700,000 barrels of oil. Its production decreased from an average of more than 60,000 barrels per day during those two months to a production of about 18,000 barrels per day at the end of 1892, and 12,000 barrels per day at the end of 1893. From this time forward the decrease was less rapid, the production being augmented from time to time by new extensions of the field. The following table shows the approximate production of the McDonald oil field by years:

*Production<sup>a</sup> of oil from the McDonald field, Washington and Allegheny counties, Pa., 1890-1909.*

	Barrels.		Barrels.
1890.....	35,000	1901.....	925,000
1891.....	7,100,000	1902.....	775,000
1892.....	8,400,000	1903.....	650,000
1893.....	5,300,000	1904.....	575,000
1894.....	4,200,000	1905.....	525,000
1895.....	3,300,000	1906.....	525,000
1896.....	2,600,000	1907.....	575,000
1897.....	1,950,000	1908.....	490,000
1898.....	1,500,000	1909 (first half).....	235,000
1899.....	1,400,000		
1900.....	1,075,000		42,135,000

The decrease in production of this field is shown graphically in figure 2.

Most of the oil in the McDonald field proper came from the Gordon and the Fifth sands, though the Fifty-foot and the Fourth sands furnished large quantities. In many of the great gushers the Gordon sand first began production at from 50 to 200 barrels per hour, which was increased to from 100 to more than 700 barrels per hour by subsequent drilling to the Fifth sand. This ratio does not hold, however, for the whole field. In many areas one or the other of these sands was entirely barren, the other producing all the oil. Also in a few places within the productive territory barren spots occur in both sands. In such cases the sands are reported as being hard and close without the open pebbly pay streak of the oil-bearing areas.

South of Sturgeon an area of several hundred acres was found to be unproductive, both the Gordon and the Fifth sands being of poor quality. Farther to the south both sands apparently assume their normal thickness and porosity in the pools extending from the county line south of McDonald east to the vicinity of Bridgeville, but in this region neither of them furnishes much oil. Northwest from the McDonald pool the Gordon sand appears to keep almost its normal thickness, but is lacking in porosity. The Fifth sand seems to pinch out entirely just beyond the limits of the field, and thence northwestward is reported in comparatively few wells, where it occurs as thin close sand, or as "shale and shells."

<sup>a</sup> This production includes also all or a portion of that from the Venice, Cecil, Cuddy, Licksillet Hopper, and McCurdy fields as described in this bulletin.

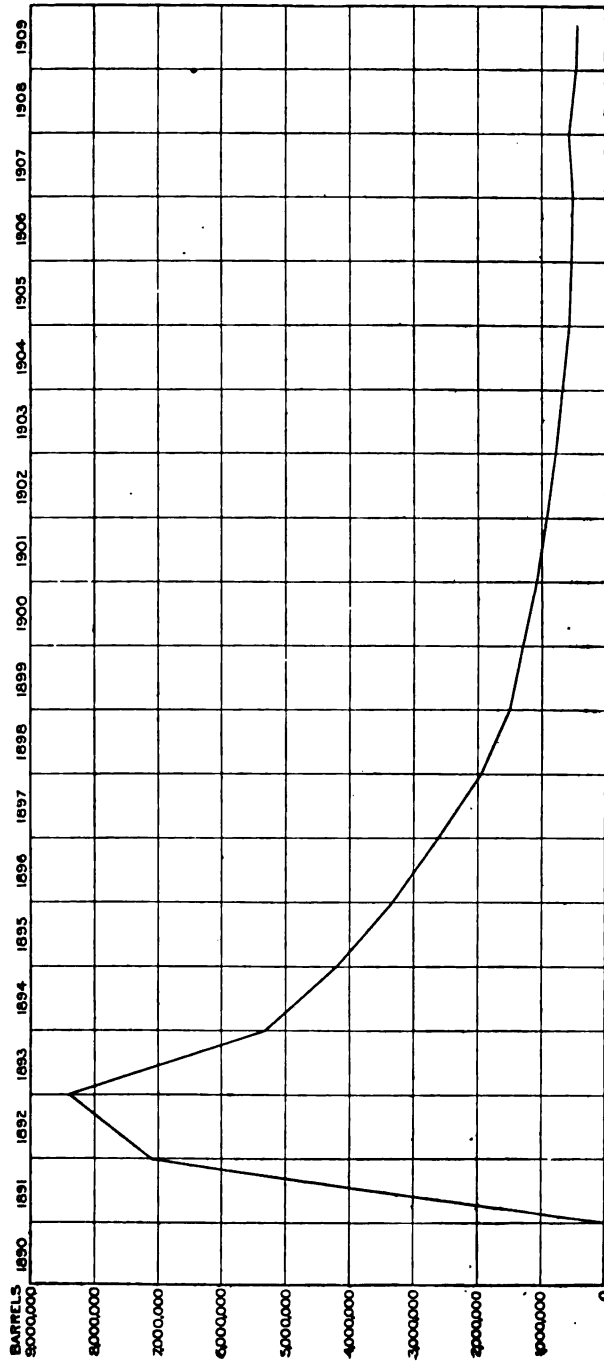


FIGURE 2.—Curve showing production of oil in the McDonald field from January, 1900 to June, 1909, inclusive.

The following records of wells in the McDonald field give a fair idea of differences in the stratigraphy of the oil-bearing sands and of some of the closely associated beds:

*Partial records of deep wells in the McDonald field, Allegheny County, Pa.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
			<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>	
48	Morgan heirs..	South Penn Oil Co.	1,082	Salt sand.....	950	110	Depth of well, 2,385 feet.
				Big Injun sand..	1,200	160	Oil at 1,899 and 2,270 feet.
				Hundred-foot sand.	1,987	30	Oil and gas at 2,275 feet.
				Fourth sand.....	2,265	14	Hard; depth of well, 2,290 feet.
49	Etta Glenn No. 1.	.....do.....	1,090	Hundred-foot sand.	1,965	55	Oil at 2,173 feet.
				Gordon sand.....	2,160	30	Oil at 2,294 feet.
				Fifth sand.....	2,282	8	
50	John Glenn No. 2.	.....do.....	1,070	Salt sand.....	900	215	Production, 30 barrels first 24 hours.
				Big Injun sand..	1,160	250	
				Hundred-foot sand.	1,868	75	Oil at 2,144 and 2,148 feet.
				Gordon sand.....	2,138	22	Fifth sand of good quality but drained; no oil or gas in it.
				Fifth sand.....	2,272	18	Oil at 2,396 and 2,410 feet.
51	Robb Heirs No. 2.	.....do.....	1,259	Gordon sand.....	2,390	20	Oil at 2,521 feet.
				Fourth sand.....	2,447	48	
				Fifth sand.....	2,515	24	
52	Robb Heirs No. 1.	.....do.....	1,227	Gordon sand.....	2,309		Depth of well, 2,339 feet; production from Hundred-foot sand.
				Hundred-foot sand.	2,150		Oil at 2,337 feet.
53	Wallace Heirs No. 5.	.....do.....	1,119	Gordon sand.....	2,232	24	Depth of well, 2,390 feet; oil at 2,246 feet.
				Fifth sand.....	2,358	15	
54	W. A. Dickson No. 8.	.....do.....	1,212	Pittsburg coal...	255		Gas at 605 feet; salt water at 1,150 feet.
				Gordon sand.....	2,368	40	Gas in Big Injun sand at 1,475 feet; in Fifty-foot sand at 2,185 feet; oil at 2,388 feet.
				Fourth sand.....	2,440		Little gas at 2,440 feet; oil at 2,511 feet.
				Fifth sand.....	2,502	27	Break of 5 feet in Gordon sand at 2,205 feet; no oil in Gordon sand above break; gas and oil at 2,214 feet.
55	W. A. Dickson No. 10.	.....do.....	1,055	Pittsburg coal...	90		Production 114 barrels first 24 hours.
				Gordon sand.....	2,190	58	
56	Mary Campbell.	.....do.....	1,251	Pittsburg coal...	230		
				Salt water.....	1,130		
				Big Injun sand..	1,310	250	
				Gordon sand.....	2,347	20	
57	Andy Shane	.....do.....	1,192	Pittsburg coal...	237		Depth of well, 2,396 feet.
				Gordon sand.....	2,354	19	
58	McMurry No. 4	.....do.....	1,054	Pittsburg coal...	75		
				Salt sand.....	940	255	
				Big Injun sand..	1,185	250	
				Hundred-foot sand.	1,955	61	
				Gordon sand.....	2,183	23	
				Fifth sand.....	2,307		
				First pay.....	2,313	11	
59	Bell No. 3.....	Jennings & Guffy.	1,111	Gordon sand.....	2,146	24	Depth of well, 2,305 feet; first oil, 2,143 feet; good sand, 2,162 feet.
				Fifth sand.....	2,268	34	

*Partial records of deep wells in the McDonald field, Allegheny County, Pa.—Continued.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
60	H. Sterling No. 9.	South Penn Oil Co.	Feet. 1,282	Pittsburg coal... Salt water..... Gordon sand..... Fourth sand..... Fifth sand.....	Feet. 234 2,120 2,360 2,420 2,488	Feet. ..... ..... 18 15 37	Depth of well, 2,525 feet.  Poor. Oil at 2,488 feet.
61	H. Sterling No. 3.	.....do.....	1,272	Pittsburg coal... Salt sand..... Big Injun sand... Hundred-foot sand. Gordon sand..... Fourth sand..... Fifth sand.....	225 1,105 1,350 2,100 2,330 2,408 2,472	..... 180 195 60 31 21 23	Salt water, 1,120 feet.    Gas at 2,412 feet. Gas at 2,475 feet; oil at 2,480 feet.
62	T. Gamble No. 6.	.....dc.....	1,094	Pittsburg coal... Salt sand..... Sand..... Gordon sand..... Fifth sand.....	..... 890 1,890 2,136 2,267	..... 245 60 20 25	
63	Gamble No. 5.	.....do.....	1,092	Salt sand..... Big Injun sand... Hundred-foot sand. Gordon sand..... Fifth sand.....	875 1,140 1,920 2,125 2,262	245 235 52 28 27	
64	J. R. Sturgeon No. 3.	.....do.....	1,098	Hundred-foot sand. Gordon sand..... Fifth sand.....	1,930 2,151 2,280	156 13 26	Gas at 1,935 feet. Gas at 2,167 feet. Gas at 2,289 feet.
65	McClelland heirs No. 2.	.....do.....	1,095	Gordon sand..... Fifth sand.....	2,156 2,270	..... .....	Oil; depth of well 2,303 feet. Oil at 2,276 feet.
66	W. J. McGill...	.....do.....	1,043	Gordon sand..... Fifth sand.....	2,070 2,217	25 .....	Depth of well, 2,221 feet. Oil at 2,218 feet; gas, 2,217 feet.
67	Jane Stewart No. 2.	.....do.....	1,158	Pittsburg coal... Salt sand..... Big Injun sand... Hundred-foot sand. Gordon sand..... Fourth sand..... Fifth sand.....	83 960 1,210 1,980 2,164 2,240 2,305	..... ..... ..... ..... ..... ..... 26	
68	J. C. Stonescraper No. 1.	.....do.....	1,187	Pittsburg coal... Hurry-up sand... Salt sand..... Big Injun sand... Thirty-foot sand Hundred-foot sand. Thirty-foot sand. Stray sand..... Gordon..... Fourth sand..... Fifth sand.....	60 142 965 1,200 1,785 1,973 2,068 ..... 2,180 2,254 2,317	5 38 225 100 30 45 26 15 28 15 15	Depth of well, 2,335 feet. Freeport coal at 612-620 feet; lower Freeport at 640 feet Gas in Stray sand.    Pay at 2,264 feet.
69	Harry Watters.	South Penn Oil Co.	1,121	Pittsburg coal... Salt sand..... Big Injun sand... Hundred-foot sand. Gordon sand..... Fourth sand..... Fifth sand.....	110 975 1,240 1,960 2,200 2,268 2,330	..... 165 240 60 33 12 20	

From these records it will be seen that the thickness of the Gordon sand ranges from 13 to 58 feet, with an average of about 26 feet, whereas the Fifth sand is from 8 to 37 feet thick, with an average of about 23 feet. These averages are probably fairly close for the productive portions of these sands throughout the entire field. The maximum of 58 feet for the Gordon sand is unusual. This maximum is reported in the W. A. Dickson well No. 10 (No. 55 on map) in which a "break" of 5 feet (see table) occurs in this sand, which is probably the division between the Gordon Stray and the Gordon, thereby reducing the latter to a thickness of 38 feet. In the most productive portions of the field these sands appear to be somewhat above their average thickness but not abnormally so. The greatest difference is not in the thickness but in the character of the sands from place to place. In the most productive portions of the field the entire sand appears to be made up of very coarse sand, containing a relatively large amount of small quartz pebbles very poorly cemented together. In the less-productive spots the sands are invariably finer grained and as a rule contain only thin streaks of pebbly material. In such areas the oil was frequently encountered after drilling several feet into the sand. From the records given in the table it will be seen that the position of the pay streak in the Gordon sand varied in different wells from the top of the sand down to a depth of 28 feet with an average distance of 13 feet 6 inches from the top. The maximum distance from the top of the Fifth sand to the pay streak is 9 feet, with 4 feet as the average.

The theoretical value of these data lies in the fact that oil and even gas are not always found in the top of the sand. There is ample evidence that in many cases a close fine-grained sand may be penetrated by a well to a depth of several feet with little or no showing of oil, but when a more porous streak is encountered oil will be produced with a pressure sufficient to cause it to flow from the mouth of the well. The same is also true of many gas wells, though in most cases where the main flow of gas comes from a pay streak low in the sand a small quantity of gas is found in the same sand above the pay streak. When it is remembered that even the closest-grained unaltered sandstones of this type contain at least from 4 to 10 per cent of pore space, the difficulty of accounting for the phenomena becomes apparent. The subject can not be dismissed by considering the rocks to be impervious, because the stubborn fact remains that no sandstone of this type has ever been found to be impervious. In reality it contains holes that aggregate from 5 to 10 or more square inches for every square foot of surface. Some of these facts are not clearly explained in theories advanced to account for the accumulation of oil and gas into pools.

Neither the Gordon nor the Fifth sand has been found to contain very appreciable amounts of salt water in that portion of the McDonald field covered by the records published above. In a few wells small quantities of salt water are said to have been found in the Gordon sand. In most cases this water appeared in wells approaching exhaustion, and at most amounted to only a few barrels per day. So far as could be learned by diligent inquiry, the oil pool occurring in the Fifth sand in that portion of the McDonald field embraced by Cecil and North and South Fayette townships shows no salt water with the oil. The principal water-bearing sand of this area is the Salt sand (one of the sandstones of the Pottsville formation); in many places also the Big Injun and less often the Hundred-foot carry more or less salt water. Below the Fifth sand no salt water has been found in this region.

*Hopper oil pool.*—The name "Hopper" is used to designate a small pool of oil in the Fourth sand which is situated about one-half mile northeast of Reissing, in South Fayette Township. The exact outline of the pool can not be easily defined, since it appears to extend as a more or less unbroken pool southwest to the Fourth sand pool of the Venice field, and north until it apparently merges with the Gordon and Fifth sand pools of the McDonald field. Eastward the extent of this pool can not be outlined by the writer because of lack of reliable logs of wells. It is known, however, to extend as far east as the B. Morgan No. 7 well (No. 74 on map), which found oil in both the Fourth and the Hundred-foot sands.

In the vicinity of wells Nos. 71 and 72 small pools of oil have been encountered in both the Gordon and the Fifth sands, though the main supply was furnished by the Fourth sand.

The pioneer well in this pool (No. 77) was drilled on the Joseph Campbell farm by C. D. Robbins, of Washington, Pa., long before the McDonald field and the fields in Cecil Township were discovered. This well struck oil and is reported to have produced more than 200 barrels before being abandoned for want of a pipe line to transport the oil. Mr. Robbins is said to have held leases on an immense tract of land extending from Ohio River southwest to Washington, Pa., which embraced most of the great oil pools in this vicinity. He drilled a number of wells on this tract, but was signally unfortunate in missing the productive portions, frequently by the narrowest margin, as indicated by the position of this well on the Campbell farm. It is now known that if this well had been located a thousand feet farther north, east, or west, it would have flowed probably several hundred barrels per day, and would have precipitated the McDonald and Venice oil excitements years before they occurred.



In this field the Fourth sand has furnished a number of flowing wells, some of which are said to have had an initial production of from 50 to 100 barrels per hour. The Gordon and the Fifth sands have also furnished a few flowing wells, but of relatively small capacity.

The field was developed in the years 1886-1899, and on the whole the wells proved to be short lived. After three or four years many of them were producing only a few barrels per day. The field is now practically exhausted and many wells have already been abandoned.

An examination of the map Plate IV will show that the Hopper field extends along a narrow, gently sloping structural terrace on the western limb of the Nineveh syncline, and that structurally, as well as stratigraphically, it is closely related to the Fourth sand pool at Venice, and may, in fact, be a part of it.

The Gordon and the Fourth sands in this field show a little water in a few places, but the amount produced with the oil in any well is very small. The Fifth sand shows no water.

*Licksillet oil and gas field.*—The name "Licksillet" is applied to the producing area situated north of Cuddy, Morgan, and Sygan, and is intended to embrace the oil pool in the Hundred-foot sand in the vicinity of the last-named town. This field extends east from well No. 74 to the edge of the productive territory in the vicinity of Sygan and north to well No. 75. It is said that wells which once furnished oil in the Hundred-foot sand have later been drilled deeper and have found gas in the Fourth or Fifth sands. Very little data relative to the production of gas in this area is available.

The name "Hundred-foot" is here evidently applied only to the lower or Fifty-foot member of the true Hundred-foot sand of the oil fields farther north in Butler and Armstrong counties. The so-called Hundred-foot sand here has an average thickness of 20 to 30 feet, and in but a single instance is it reported to be more than 60 feet thick. The Fourth, the Fifth, and the Gordon sands are probably a little below the average thickness as given above for the McDonald pool. All the sands, however, are far more uniform in thickness than in porosity; the pay streaks in them appear to be very irregular.

Attention is especially called to the fact that the Fourth and the Fifth sands carry considerable gas in wells in the vicinity of Nos. 73 and 74, and eastward from them along the southern margin of the field. It will be noticed that this is structurally the lowest part of the sands in the Licksillet and the Hopper fields, and that this occurrence, so far as structure alone is considered, does not seem to agree with the anticlinal theory of oil and gas accumulation. It is not, however, a good example, since the extent, direction, and thickness of the pay streaks in these sands are not sufficiently well known to admit of a clear and definite statement of all the conditions which, according to that theory, might be responsible for these accumulations.

The following table of well records, though very imperfect, may prove of some stratigraphic value:

*Partial records of deep wells in the Licksillet and Hopper oil and gas fields, South Fayette Township, Allegheny County, Pa.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
			<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>	
70	N. G. Cook No. 1.	South Penn Oil Co.		Pittsburg coal... Fifty-foot sand... Gordon sand....	270 2,180 2,373	7 30 37	Depth of well, 2,446 feet.
71	S. Jackson No. 5.	do.	1,190	Pittsburg coal... Fourth sand....	270 2,408	230 27	Commenced flowing at 2,420 feet.
72	J. Campbell.	do.		Pittsburg coal... Stray sand..... Gordon sand.... Fourth sand.... Fifth sand.....	270 2,190 2,230 2,292 2,352	128 35 24 13 22	Depth of well, 2,377 feet. Oil at 2,362 feet.
73	W. J. Catherwood No. 1.		1,111	Gordon sand.... Fourth sand....	2,280 2,331	20 22	Small production from Gordon sand; small amount of water in Fourth sand.
74	B. Morgan No. 7.	South Penn Oil Co.	1,155	Pittsburg coal... Salt sand..... Hundred-foot sand. Gordon sand.... Fourth sand....	265 1,100 2,171 2,390 2,436	240 20 18 24	Light showing of oil. Oil at 2,440-2,455 feet.
75	M. & L. Bank No. 3.	do.	1,209	Pittsburg coal... Hundred-foot sand.	322 2,243	24	Depth of well, 2,267 feet. Oil at 2,245 feet.

*Cuddy oil and gas field.*—The oil pool in the Hundred-foot sand in the Licksillet field appears to have a southwestern extension, which connects it more or less closely with a small oil pool in this sand lying a short distance south of Cuddy post office. Most of the oil from this field has come from the pool in the Hundred-foot sand, but the Fourth sand has produced both oil and gas in a few wells and the Fifth sand has furnished considerable quantities of gas. The Gordon sand appears to be so thin and of such inferior quality in this field that no mention is made of it in many of the records. In wells Nos. 192 and 196 this sand is accorded a thickness of 32 feet and 70 feet, respectively, but in the latter well the intervals between the Gordon sand and the Fourth and Fifth sands and the Pittsburg coal indicate strongly that the true Gordon sand is probably not more than 22 feet thick, the upper portion probably being equivalent to the Gordon Stray sand. In the W. S. Hickman No. 2 well the Gordon sand is reported to be only 10 feet thick, and in others it appears to be represented by only a few feet of "shale and shells."

The Fourth sand in this pool seems to be normal in thickness and quality, being from 10 feet to 30 feet thick, with an average of about 20 feet. The oil and gas "pays" in this sand are found from the top to 25 feet below the top, but in no record is the thickness of the pay streak given. The Fifth sand has about the same thickness as the

Fourth sand and its pay streak appears to be equally as erratic. In well No. 191, on the W. S. Hickman farm, the total thickness of the Hundred-foot sand as given in the well record is 12 feet, with the pay streak 5 feet from the top. This sand is the Gantz, or the upper member of the Hundred-foot, and does not represent the entire bed, the Fifty-foot, or lower member, probably being present as sandy shale alternating with thin sandstone "shells." In well No. 193 the Hundred-foot is reported to be 18 feet thick, as against 11 feet in No. 194. In well No. 195 this sand is called the Fifty-foot and is 27 feet thick, and in wells Nos. 196, 197, 198, and 199 it is, respectively, 13, 10, 8, and 12 feet thick. In most of these wells a thin pay streak containing oil occurs near the middle of the sand.

The maximum daily production from the best wells in this pool was not large, being probably less than 100 barrels a day. Salt water is found in the Hundred-foot sand in a number of wells, and it is thought that one or two wells in the Fourth sand have also shown small quantities of salt water. The Gordon and the Fifth sands are reported dry. The great salt-water sands of this vicinity, as elsewhere in the Carnegie quadrangle, are the Big Injun and the Salt sands. This water is always under sufficient head to fill up several hundred feet in the well and in some cases to flow from the well mouth. It is usually cased off with 5½-inch casing at depths of 1,250 to 1,400 feet.

The following are partial records of wells in the Cuddy field:

*Partial records of deep wells in Cuddy oil and gas field, South Fayette Township, Allegheny County, Pa.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
190	Jordan heirs No. 1.	Manufacturers Light & Heat Co.	<i>Feet.</i> 1,096	Pittsburg coal... Salt sand..... Gantz sand..... Fifth sand.....	<i>Feet.</i> 305 1,300 2,140 2,522	<i>Feet.</i> ..... ..... ..... 8	Depth of well, 2,711 feet. Broken and shelly.
191	W. S. Hickman	South Penn Oil Co.	1,119	Pittsburg coal...  Hundred-foot sand. Fourth sand..... Fifth sand.....	310  2,205 2,474 2,536	.....  12 ..... .....	Depth of well, 2,572 feet. Oil at 2,210 feet.
192	W. S. Hickman No. 1.	.....do.....	1,161	Pittsburg coal...  Gordon sand....  Fourth sand.... Fifth sand.....	341  2,453 2,516 2,578	.....  32 36 14	Bottom Hundred-foot sand, 2,320 feet. Depth of well, 2,607 feet. Oil at 2,540 feet. Gas at 2,582 feet.
193	W. S. Hickman	.....do.....	1,127	Pittsburg coal... Hundred-foot sand. Fourth sand.... Fifth sand.....	310 2,216 2,480 2,530	..... 18 15 10	Depth of well, 2,566 feet. No oil or gas in Gordon, Fourth, or Fifth sands.
194	.....do.....	.....do.....	1,127	Pittsburg coal...  Hundred-foot sand.	320  2,200	.....  11	Depth of well, 2,240 feet. Oil at 2,203 feet.

*Partial records of deep wells in Cuddy oil and gas field, South Fayette Township, Allegheny County, Pa.—Continued.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
			<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>	
195	W. J. Wallace No. 1.	South Penn Oil Co.	1,111	Pittsburg coal...	320	.....	First pay, oil, at 2,406 feet.
				Fifty-foot sand...	2,292	27	
				Fourth sand.....	2,481	15	
196	W. J. Wallace No. 2.	.....do.....	1,117	Pittsburg coal...	210	.....	Oil.
				Fifty-foot sand...	2,210	13	
				Gordon sand.....	2,369	70	Gas at 2,546 feet.
				Fourth sand.....	2,474	24	
				Fifth sand.....	2,522	30	
197	W. S. Hickman	.....do.....	1,117	Pittsburg coal...	290	.....	Depth of well, 2,206 feet.
				Hundred-foot sand.	2,186	10	
198	W. S. Wallace No. 1.	.....do.....	1,081	.....do.....	2,165	8	Oil.
199	W. S. Wallace No. 3.	.....do.....	1,113	.....do.....	2,201	12	Do.
	W. S. Hickman	.....do.....		Pittsburg coal...	320	.....	Depth of well, 2,579 feet. Oil at 2,217 feet. Gas at 2,556 feet.
				Hundred-foot sand.	2,210	20	
				Gordon sand.....	2,438	10	
				Fourth sand.....	2,493	10	
				Fifth sand.....	2,552	10	

Northwest of the McDonald oil field, in North Fayette Township, a barren tract from one-half mile to 3 miles wide extends from the western edge of the quadrangle northeast to the northern boundary in the vicinity of Ewings Mill. In this area oil and gas in paying quantities have been found only in very small pools of only a few wells each. Data relative to the condition of the various sands are very scarce, since comparatively few wells have been drilled, and only a small percentage of the records of those drilled has been preserved.

In the vicinity of well No. 80, on the farm of the Dixon heirs the Gordon, the Fourth, and the Fifth sands have supplied 3 or 4 wells with gas in considerable quantities, with a closed pressure of about 600 pounds per square inch. The record of well No. 80 gives the Gordon sand a thickness of 22 feet, which is about the average. From information collected from drillers in this part of the township the sands appear as a whole to be much thinner and to have more erratic pay streaks than farther south. This is especially true of the Fifth sand, which pinches out completely at many points northwest of the McDonald pool. This sand is found at a number of places farther northwest, but it evidently exists as a horizon of irregular lenses rather than as a continuous bed. The Fourth sand in general closely resembles the Fifth in the manner of its distribution, though as a whole it is probably more uniform in thickness and texture. The Gordon sand is by far the most uniform in thickness and texture of these three great oil-bearing beds. In few places have drillers failed to find at least a few feet of sandstone at this horizon; but the sand shows considerable variation both in thickness and in quality.

The Nineveh Thirty-foot and the Hundred-foot sands show a tendency to thicken going northwest from the McDonald field. This is especially true of the former, which becomes the principal oil-bearing bed in the Imperial oil and gas field. In this township the Nineveh Thirty-foot sand shows no water. The Hundred-foot sand is water bearing, however, in a number of wells. In well No. 80 the 4½-inch casing evidently shuts off the water from the Hundred-foot sand at 1,960 feet. In the oil pool at well No. 86 the Hundred-foot sand produces salt water with the oil. At many places throughout this area drillers report dry wells in the Hundred-foot sand in close proximity to others from which salt water was obtained. The percentage of wells not containing salt water in this sand appears to decrease materially going north. In this portion of North Fayette Township the Gordon, the Fourth, and the Fifth sands are seldom, if ever, water bearing, though the Gordon is known to contain a copious supply of salt water in the Moon and the Coraopolis fields, at and near the northwest corner of the quadrangle.

*Imperial oil and gas field.*—The Imperial oil and gas field occupies an area including the northern edge of North Fayette Township and the southern parts of Finley and Moon townships. In that portion of the field lying within North Fayette Township most of the oil is found in the Nineveh Thirty-foot sand, though a small quantity of oil in a few scattered wells comes from the Hundred-foot sand and some gas from the Gordon sand. The Nineveh Thirty-foot sand has furnished no large gushers in this field. Few wells in it have produced more than 100 barrels per day, and the average initial production is far less than that, being probably less than 25 barrels per day. This field has been developing since about the year 1898, though many of the wells in the southwestern part are much more recent. At the time of the writer's last visit, in December, 1907, the field was being extended slowly southwest, beyond the western border of the quadrangle. At the extreme southwest end of this field four wells on the Nancy Crooks farm illustrate the variations to be found in the water conditions of the Hundred-foot sand; in two wells salt water from this sand rose almost to the top, filling the holes for more than 1,500 feet; of two adjoining wells, not over 400 feet away, one had a small showing of water in the Hundred-foot sand and the other had no water at all, though the quality of the sand seems to be practically the same in all the wells, and there seems to be little reason to doubt that the sand is continuous between the wells, since it is always found in wells drilled to that horizon. In a few wells of this portion of the Imperial oil field the Hundred-foot sand is oil and gas bearing.

The following table of records of wells in the northern part of North Fayette Township gives a fair idea of the position and relative thickness of the oil sands:

*Partial records of deep wells in the northern part of North Fayette Township, Allegheny County, Pa.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
80	Wm. Dixon heirs No. 3.	Lawrence Gas Co.	<i>Feet.</i> 1,112	Thirty-foot..... Gordon sand..... Fourth sand..... Fifth sand.....	<i>Feet.</i> 2,040 2,124 2,181 2,240	<i>Feet.</i> 20 22	Gas. Do. Do.
81	McFarland No. 1.	G. M. Withington.	1,106	Hundred-foot sand. Thirty-foot sand	1,885 2,013	40 14	Gas at 1,897 feet. Depth of well, 2,045 feet.
82	do.....	Guffey & Galey..	1,097	Hundred-foot sand. Thirty-foot sand Gordon sand..... Fifth sand.....	1,882 2,008 2,110 2,192	45 15 10 17	Depth of well, 2,269 feet; water in Hundred-foot sand. Gas at 2,204 feet.
83	do.....	South Penn Oil Co.	1,097	Hundred-foot sand. Fourth sand....	1,896 2,209	41 14	Depth of well, 2,223 feet.
84	Ehle No. 1.....	Volant Oil & Gas Co.	1,173	Thirty-foot sand	2,080	.....	Depth of well, 2,095 feet; production 5 barrels first 24 hours.
85	Miller heirs No. 6.	do.....	1,187	do.....	2,077	14	Oil at 2,080 feet; depth, 2,094 feet.
86	Pittsburg Coal Co. No. 5.	do.....	1,128	Pittsburg coal... Salt sand..... Hundred-foot sand. Thirty-foot sand	94 1,035 2,025 2,133	8 180 40 24	Freeport coal 300-307 feet. Biddle rock 1,565-1,600 feet. Pay at 2,137-2,150 feet.
a 87	Pittsburg Coal Co. No. 7.	do.....	1,191	Pittsburg coal... Hurry-up sand.. Salt sand..... Big Injun sand.. Hundred-foot sand. Thirty-foot sand	155 768 1,116 1,310 2,082 2,208	7 14 159 195 33 22	Total depth, 2,232 feet. Freeport coal at 867-874 feet. Stray coal at 960-990 feet. Bitter rock at 1,645-1,882 feet. Oil at 2,211-2,220 feet.
a 88	A. W. Crooks No. 5.	Jack O'Riley.....	1,263	Pittsburg coal... Salt sand..... Big Injun sand.. Hundred-foot sand. Thirty-foot sand	135 1,055 1,250 2,050 2,179	195 380 22 18	Show of gas. Show of oil at 2,031-2,060 feet. Oil pay at 2,183 feet.
a 89	A. W. Crooks No. 4.	do.....	1,220	Salt sand..... Big Injun sand.. Hundred-foot sand. Thirty-foot sand	1,030 1,205 2,020 2,148	175 173 30 17	Depth of well, 2,171 feet. Freeport coal at 785 feet; second coal at 885 feet; oil at 2,155 feet; break in Big Injun at 1,300 feet.
90	Mary Johnson No. 1.	.....	885	Salt sand..... Hundred-foot sand. Thirty-foot sand	670 1,664 1,795	207 41 19	
91	Mary Mahoney No. 2.	.....	930	Hundred-foot sand. Thirty-foot sand	1,708 1,838	39 27	
92	Seifried lease No. 1.	Fisher Oil Co.....	877	Salt sand..... Big Injun sand.. Smiths Ferry sand. Stray sand..... Hundred-foot sand. Good sand.....	725 860 1,320 1,630 1,663 1,663	90 260 20 5 ..... 8	Depth of well, 1,679 feet; Bitter rock at 1,280-1,305 feet; Thirty-foot sand shells at 1,500-1,545 feet; red rock at 1,575-1,605 feet; oil at 1,663-1,664 feet.

a Wells 87, 88, and 89 are off the western margin of the quadrangle southwest of No. 86.

*Partial records of deep wells in the northern part of North Fayette Township, Allegheny County, Pa.—Continued.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
93	Troutman No. 1 (formerly Stewart No. 1).	.....	<i>Feet.</i> 890	Hurry-up sand..	<i>Feet.</i> 350	.....	Water.
				Salt sand.....	850	.....	
				Gantz sand.....	1,615	.....	Black oil and water.
				Hundred-foot sand.	1,651	40	
				Thirty-foot sand	1,774	23	
				Gas sand.....	1,808	19	
				Gordon sand.....	1,907	42	Gas at 1,911 feet.

#### FINLEY AND MOON TOWNSHIPS, ALLEGHENY COUNTY.

Only portions of Moon and Finley townships are embraced in the Carnegie quadrangle. Though these two townships include all of that part of the quadrangle lying northwest of Montour Creek, a large part of Finley lies farther west in the Burgettstown and Beaver quadrangles, and Moon Township extends north to Ohio River in the Sewickley quadrangle; the portions of these townships lying outside the Carnegie quadrangle have been discussed in previous survey reports.<sup>a</sup> That portion lying within this quadrangle includes part of the Imperial and the Moon oil and gas fields and the McCormick pool, together with several very small pools of oil and gas that are represented by scattered wells. In this region the Nineveh Thirty-foot, the Gordon, the Hundred-foot, the so-called Boulder, and the Fifth sands produce more or less oil and gas, by far the greatest amount coming from the Nineveh Thirty-foot and the Gordon.

*Imperial oil and gas field.*—The pool known as the Imperial oil and gas field extends from the south into Finley and Moon townships. The production is mostly from the Nineveh Thirty-foot sand, though some wells have made more or less oil from the Hundred-foot sand and gas from the Boulder (?) sand. Water occurs in the Salt sand and also in many wells in the Big Injun and the Hundred-foot sands. The Fifth sand is absent over much of the southern parts of both these townships and is seldom reported in logs of wells in the Imperial field. The Fourth sand is usually represented here by thin sandstone "shells" and shale, and is not reported as containing oil, gas, or water. The other oil sands produce no water.

The oil in the Nineveh Thirty-foot sand occurs from 6 to 20 feet below the top in pay streaks varying from less than 1 foot to 10 or 15 feet in thickness. Few of the wells flowed when first drilled in, but most of them filled up several hundred feet with oil. None of the wells were very large; many of them, however, yielded from 25 to

<sup>a</sup> For portion in Burgettstown quadrangle see Bulletin 318; for Beaver quadrangle, see Folio 134 and Bulletin 279; for Sewickley quadrangle, see Folio 176. (See also oil and gas bulletin to be published by the Top. and Geol. Survey Comm. Pennsylvania.)

100 barrels per day, and are considered by producers to be capable of furnishing oil for a long time.

The most northeastern extension of the Nineveh Thirty-foot pool in the Imperial field is in the wells in the vicinity of No. 98. In this part of the field the Hundred-foot sand produces salt water in one well and is apparently dry in the next. In well No. 98 a small amount of salt water was found in the Gordon sand, which is here only 7 feet thick. The Fourth sand is 8 feet thick in this well, and the Fifth sand is absent.

*McCormick oil and gas field.*—The McCormick field appears to be entirely cut off by an unproductive strip of territory from the northern end of the Imperial field in the vicinity of well No. 98. Oil occurs in the Hundred-foot and the Nineveh Thirty-foot sands, but from the available facts the former seems to have been the most productive. The Gordon, the Fourth, and the Fifth sands are all present in normal thickness in this field and are gas bearing to a greater or less extent. Less than a dozen records of wells in the field are available. Of these Nos. 99 and 111 show the thickness of the oil-bearing sands, with the exception of the Fifth sand, which ranges up to about 20 feet in thickness. In one or two wells gas was also found in considerable quantities in what is called the Sixty-foot sand, which is probably equivalent to the Connoquenessing sandstone member of the Pottsville formation. This gas was accompanied by large quantities of salt water, which soon shut off the flow. The McCormick field is now practically exhausted and most of the wells have been abandoned.

*Ewings Mill oil and gas field.*—Northeast of the McCormick field a few wells in the vicinity of Ewings Mill have found gas in the Hundred-foot, the Nineveh Thirty-foot, and the Gordon sands, and have flowed more or less oil from the Hundred-foot and the Gordon sands, but the total amount of oil obtained was small. The wells have been good gas producers, however, and still furnish considerable quantities.

From the map (Pl. IV) it will be seen that the Imperial, the McCormick, and the Ewings Mill fields form a chain of pools in the different producing sands extending across the northwest corner of the quadrangle from northeast to southwest. Northwest of this productive belt occurs a barren area from 1 to 2 miles in width in which only small isolated pools occur. In this area the Fifth, the Fourth, and the Gordon sands furnish most of the gas, which is in such small pools that each is adequately drained by one or two wells.

*Aten oil and gas field.*—The largest productive area within this barren belt is the Aten field, which has furnished oil from the Hundred-foot sand in a dozen or more wells, and gas from the Gordon, the Fourth, and the Fifth sands. With the exception of the Hundred-foot, these sands change greatly in thickness and quality in short distances within the field. This is especially true of the Fifth sand,



which is found in small lenses that apparently pinch out in all directions. The Gordon sand appears to be a continuous bed over the whole area, but seldom reaches its normal thickness. Attention is called to the fact that farther up the dip of the sand toward the north the Gordon sand is oil bearing, and contains salt water in both the Moon and the Coraopolis pools, whereas below them in the Aten and the McCormick fields and in the barren area surrounding them this sand shows no salt water and sometimes contains considerable quantities of gas.

This field is 10 or 15 years old, and now furnishes only a few barrels of oil per day from a small number of wells. The supply of gas is also greatly reduced.

Well No. 94 on the G. W. Beitsinger farm was drilled in 1907 in an endeavor to find a southwestern extension of the Aten field. This well produced a small amount of gas from the Hundred-foot sand, which is here 28 feet thick and without water. The well was drilled through the horizon of the Gordon and possibly to that of the Fourth sand, but no sand was found below the Hundred-foot. It seems probable that the horizon of the Fifth sand was not reached in this well. In well No. 97 on the John Irving farm, the Hundred-foot, the Gordon, and the Fourth sands were found to be 40, 20, and 13 feet thick, respectively. No statement is made in the record of this well concerning the water conditions in these sands. However, the first well to the south of No. 97, on the Stoddard farm, is said to have been drilled to a depth of 2,187 feet without finding sufficient water to justify the use of casing. This is one of the rare instances where a well within the oil region of southwestern Pennsylvania has been sunk more than 2,000 feet without finding considerable quantities of salt water in some of the sandstones through which it passed. This fact appears more remarkable when it is remembered that one or more of the beds of the Pottsville formation and the Burgoon sandstone member of the Pocono formation, which are equivalent to the Salt, the Gas, and the Big Injun sands, are highly charged with salt water at almost every place where they have been touched by the drill in this quadrangle. In the Coraopolis oil field less than  $1\frac{1}{2}$  miles north of well No. 97 and directly up the slope of the rocks, the Gordon sand contains salt water in such quantities and under such head that it is slowly drowning out the wells which obtain their oil from that sand.

*Moon oil pool.*—The northwest corner of the Carnegie quadrangle includes a portion of the southern end of the Moon pool in the Gordon sand. This pool lies both north and west of the limits of the quadrangle and probably covers as much as a square mile. This pool has furnished a considerable quantity of oil, many of the wells having

had a maximum capacity of 25 to 100 barrels per day. Most of the wells have been producing for from 12 to 18 years, and are almost pumped out; others have been invaded by salt water from the Gordon sand in such quantities as to shut off the supply of oil.

In a few wells the Hundred-foot sand has furnished limited quantities of both oil and gas, which was in most cases accompanied by salt water. The Fourth sand is gas bearing in a few wells in the vicinity of the Moon pool, and it seems probable that the Fifth sand also contains more or less gas in areas where it is present in good quality, but no specific instances are mentioned in the logs of wells.

*Partial records of deep wells in that portion of Finley and Moon townships, Allegheny County, Pa., included within the Carnegie quadrangle.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
94	G. W. Beltsinger No. 1.	McClay Drilling Co.	Feet. 1,072	Salt sand..... Big Injun sand..... Bitter rock sand..... Broken sand..... Hundred-foot sand.	Feet. 850 1,105 1,345 1,600 1,777	Feet. 110 200 15 95 28	Depth of well, 2,054 feet; water. No water in or below Hundred-foot sand. Small gas well at 1,780 feet.
95	Stewart heirs No. 1.	Ohio Valley Gas Co.	1,070	.....do..... Fourth sand..... Fifth sand.....	1,750 2,080 2,117	..... ..... 14	Depth of well, 2,131 feet.
96	H. A. Aten No. 3.	Forest Oil Co.....	1,077	Hundred-foot sand. Gordon sand..... Fourth sand..... Fifth sand.....	1,819 2,056 2,128 .....	38 ..... 6 .....	Depth of well, 2,179 feet; gas at 1,820 feet. Gas at 2,128 feet. None; shells and slate.
97	J. Ewing No. 1.	Montour Gas Co..	968	Hundred-foot sand. Gordon sand..... Fourth sand.....	1,690 1,920 1,990	40 20 13	
98	J. B. Meanor...	Leonard & Co....	922	Hundred-foot sand. Thirty-foot sand..... Boulder sand..... Gordon sand..... Fourth sand.....	1,660 1,786 1,832 1,939 1,988	35 25 15 7 8	No water; depth of well, 2,157 feet; oil at 1,793 feet; gas at 1,807 feet. Little water. No Fifth sand.
99	J. McCormick..	South Penn Oil Co.	1,111	Hundred-foot sand. Thirty-foot sand..... Gordon sand (estimated). Fourth sand.....	1,840 1,974 2,056 2,098	45 43 ..... 15	Gas at 1,845 feet; oil at 1,855 feet; oil at 2,012 feet. Gas at 2,101 feet.
100	Scott No. 1....	Philadelphia Gas Co.	.....	Sand, white..... .....do.....	1,618 1,845	30 9	Salt water. Oil; depth of well, 2,337 feet.
101	C. Ehle No. 3..	Manufacturers Light & Heat Co.	1,003	Salt sand..... .....do..... Big Injun sand..... Squaw sand..... Hundred-foot sand. Thirty-foot sand	800 870 990 1,330 1,850 1,974	40 100 150 50 30 12	Total depth, 2,290 feet. Little show of oil; no gas.
102	Mary Johnston No. 13.	.....do.....	1,078	Salt sand..... .....do..... Big Injun sand..... Squaw sand..... Hundred-foot sand. Thirty-foot sand	820 870 1,050 1,350 1,828 1,960	40 105 250 40 44 21	Depth of well, 1,983 feet. Break, 5 feet; slate at 1,847 feet. First show of oil.

*Partial records of deep wells in that portion of Finley and Moon townships, Allegheny County, Pa., included within the Carnegie quadrangle—Continued.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
103	R. Jeffery No. 2.		Feet. 1,045	Salt sand..... Hundred-foot sand. Thirty-foot sand	Feet. 845 1,840 1,978	Feet. 157 44 14	
104	Stewart No. 1.		873	Hundred-foot sand. Thirty-foot sand Bowider sand...	1,633 1,752 1,798	45 18	Depth of well, 1,811 feet. Pay at 6 to 9 feet. Gas at 1,806 feet.
105	Wm. Adams No. 6.		987	Hundred-foot sand. Thirty-foot sand  Bowider sand... Gordon sand.... Fourth sand....	1,740 1,863  1,912 1,998 2,070	 18  5 35 8	Depth of well, 2,145 feet. Pay at 1,869-1,874 feet. Show of gas. Good pebbly sand. No Fifth sand.
106	Wm. Adams No. 1.		995	Hundred-foot sand. Thirty-foot sand	1,738 1,870	45	Depth of well, 1,936 feet. Oil at 1,895 feet.
107	A. Adams No. 2.		989	Hundred-foot sand.	1,736	45	Oil, 1,880-1,890 feet.
108	Knopf No. 3...	Philadelphia Gas Co.	838	.....do..... Thirty-foot sand Gordon sand....	1,537 1,714 1,812	75 22	Freeport coal, 400 feet. Gas at 1,717 feet.
109	Dorrington No. 1.	Manufacturers Light & Heat Co.	778	Salt sand..... Big Injun sand.  Hundred-foot sand. Thirty-foot sand Gordon sand.... Bottom sand....	500 690  1,465 1,641 1,745 1,765	130 220  40   	Salt water at 190 feet. Freeport coal at 325 feet. Break, sand, and slate; oil at 1,495 feet. Gas at 1,750 feet.
110	T. M. Ewing...	Philadelphia Gas Co.	754	Hundred-foot sand. Thirty-foot sand Gordon sand.... Fourth sand....	1,420 1,595 1,690 1,770	78 15 15 10	Depth of well, 2,005 feet. Gas at 1,700 feet. Gas at 1,772 feet.
111	Anna Wilson...	.....do.....	1,079	Fifty-foot sand. Stray sand..... Gordon sand.... Fourth sand....	1,840 2,020 2,076 2,185	27 76 27 7	Depth of well, 2,210 feet. Gas at 2,089 feet.

From this table it will be seen that the oil sands as a whole are variable throughout the area. This is emphasized by a study of all the records and other data that are available regarding these sands. From these facts it seems very probable, however, that the Hundred-foot sand is present throughout the two townships, and that the Nineveh Thirty-foot and the Gordon sands, though subject to more variations in thickness and texture than the Hundred-foot, may still be considered as fairly constant in occurrence. The Fourth and the Fifth sands show great changes in thickness and texture in short distances, and the Fifth sand especially is evidently made up of a number of small disconnected lenses which occupy about the same horizon.

#### ROBINSON AND STOWE TOWNSHIPS, ALLEGHENY COUNTY.

Robinson and Stowe townships lie east and northeast of Moon, Findley, and North Fayette townships, and include most of the productive areas northeast of the McDonald field. It is not possible

to say definitely that these pools are extensions of the McDonald field and are therefore directly connected with it, yet there is no doubt that they are closely related structurally, and that they are not only contemporaneous but have all been formed by the same geologic processes, whatever these may have been. In a study of these pools it is therefore well to keep in mind the general conditions described in the McDonald field, and to consider them as virtually belonging to the same general area of accumulation, though they may not in fact be parts of the same pools.

From the junction of North Fayette, Collier, and Robinson townships northeast to the vicinity of Union Church the Fifth sand is the principal oil-bearing bed. From Moon Run north to Ohio River at the head of Neville Island the Gordon and the Gordon Stray sands also furnish oil or gas in an almost continuous belt. The Gordon sand also appears to be productive from Moon Run east to Chartiers Creek south of McKees Rocks. From Ewings Mills east across the northern edge of the quadrangle to Neville Island the Hundred-foot sand is the principal oil producer. In this area the Gordon, the Fourth, and the Fifth sands furnish more or less gas. In the vicinity and south of Beacon a considerable pool of oil in the Nineveh Thirty-foot sand has been developed. Here the Hundred-foot sand is also oil-bearing, and frequently small pools of gas are found in the Fifth sand.

*McDonald oil field.*—A small area in the southwest corner of Robinson Township south of Campbells Creek seems to be the northeast limit of the Fifth sand pool of the McDonald field, though it is possible that the Fifth has a continuous oil-bearing belt from this field in the vicinity of well No. 68 eastward into the McCurdy pool and thence to the pools in the Moon Run field farther north. From the available data, however, it seems that a narrow belt of unproductive territory near the head of Campbells Creek may possibly cut off the McDonald field from the McCurdy field, and that another dry belt may lie between the latter and the Moon Run field.

The Fifth sand in the southwest corner of Robinson Township has a maximum thickness of as much as 35 or 40 feet. Toward the north and west the sand seems to be very irregular and on the whole is much thinner. It is not known by the writer from what sand the wells at the head of Pinkertons Creek produce, but in the Hall Kelso well No. 8 (No. 151 on map) only 4 feet of sand is recorded in a very imperfect log. Other data obtained from drillers indicate that the Fifth sand here shows its characteristic variations in thickness.

The capacity of the wells of this part of the McDonald field is not known, but it is believed that formerly some of them produced several hundred barrels per day. They have long since been pumped down to a production which is becoming smaller each year, and

after a few years will doubtless cease. The oil is encountered only in the softer, more porous portions of the sand, many of these pay streaks being largely made up of small water-worn quartz pebbles.

The other sands of this area are strikingly barren of either oil or gas. In a few places the Hundred-foot sand shows more or less gas at the top, with salt water in the lower part. But little can be learned from the available records of the thickness and texture of these sands. In well No. 148 the Hundred-foot and the Gordon sands are shown to be 66 and 25 feet thick, respectively. No mention is made of the Fourth sand, and it may be absent or represented only by "slate and shells."

The Fifth sand is said to produce small amounts of salt water in most of these wells. Salt water is also encountered in the Hundred-foot sand, which in a few wells arose several hundred feet. The Gordon sand shows no water in this field.

*McCurdy oil field.*—The McCurdy pool was developed in 1890–1893. A well brought in on October 16, 1890, on the McCurdy farm began flowing at the rate of 600 barrels per day. The development of the field followed rapidly. In May, 1891, wells on the W. E. Riddle and Jane Riddle farms began flowing at from 60 to 100 barrels per hour. About the same time a well on the parsonage lot of the Union Church property came in at 60 barrels per hour. Probably the best well in the field was on the Bell farm, which began flowing at the rate of 200 barrels per hour. Many of the wells which followed produced from 50 to 100 barrels per day.

The oil came from the Fifth sand, which is here from 10 to 30 feet in thickness, with an average of scarcely 20 feet. Regardless of the thin sand, however, these wells have produced an enormous quantity of oil, and many of them, after 18 years of constant pumping, still furnish from 1 to 10 barrels per day. The Fifth sand is said to show some water in this pool, as does also the Hundred-foot, but data relative to the water conditions are too meager to be of value.

The Gordon and the Hundred-foot sands furnished some gas in this field, but the Fourth sand appears to be of no importance. From the available data it is difficult to outline the McCurdy field on the northeast, since it is not possible to point out the limit of the Fifth sand oil pool in that direction.

*Moon Run oil field.*—In this paper the name Moon Run is tentatively applied to the field in the vicinity of the village of Moon Run, thence north to Ohio River and east as far as Chartiers Creek.

In the immediate vicinity of Moon Run and eastward the Gordon sand furnishes most of the oil; north the Fifth becomes the principal oil producer and the Gordon carries gas. Very few wells in this field furnish oil in the Fourth sand. Many of the wells show some water in the Gordon sand, but only in small quantities. The

Fourth and the Fifth sands usually show no salt water, though small quantities are sometimes found.

The thickness of the Gordon sand in the Moon Run field appears from the records to vary between 10 and 66 feet, with an average of between 30 and 50 feet. The apparent increased thickness of this sand from what it is farther southwest seems to be due to the union of the Gordon Stray and the Gordon into a single bed of sandstone. No conclusive evidence is available to settle this point, but the combination of the sands, as indicated by the interval from the Pittsburg coal to the Gordon Stray (where that sand is differentiated by drillers), is about the same as that from the Pittsburg coal to the top of the Gordon sand in those areas where it has its maximum thickness. In areas where both the Gordon and the Gordon Stray sands are reported, the former is rarely more than 25 or 30 feet in thickness; furthermore, where the Gordon is thickest the Gordon Stray is not mentioned in the records; but in some of them a hard streak of sand near the middle of the Gordon is reported as separating two distinct pay streaks. This evidence taken collectively over both these townships seems to justify the conclusion that the Gordon and the Gordon Stray sands frequently unite into a single stratum, with a total thickness of 40 to 65 feet. With this possibility in mind, it becomes evident that contours drawn on the top of what the drillers term the Gordon sand may possibly involve considerable error, since in one well the elevation of the top of the Gordon sand may be used and in some other well where the two sands are united the top of the so-called Gordon may be in reality at the horizon of the Gordon Stray sand. It is, therefore, well to remember in studying the structure map that in those areas where the Gordon sand is shown by the records in the table within to be thickest, the top of the true Gordon sand may be from 20 to 30 feet below that shown by the contours.

Oil in the Gordon sand in the vicinity of Moon Run and east of that point is generally found in a pay streak from 3 to 15 feet below the top of the sand. This pay streak is seldom more than 10 feet in thickness and will probably average less than 5 feet. It is soft and usually composed of coarse sand with a variable quantity of quartz pebbles scattered through it. In a number of records, of which that of well No. 142 in the table given within is an example, no show of either oil or gas was encountered in drilling the well until several feet of the sand had been penetrated; then within the space of 5 feet, and sometimes even less, the whole volume of gas and oil would be tapped and turned loose with a pressure sufficient to fill up the hole for hundreds of feet and even to flow at the rate of several hundred barrels per day. Below such an oil zone many wells passed through several feet of somewhat harder, closer sandstone, which showed no indication of

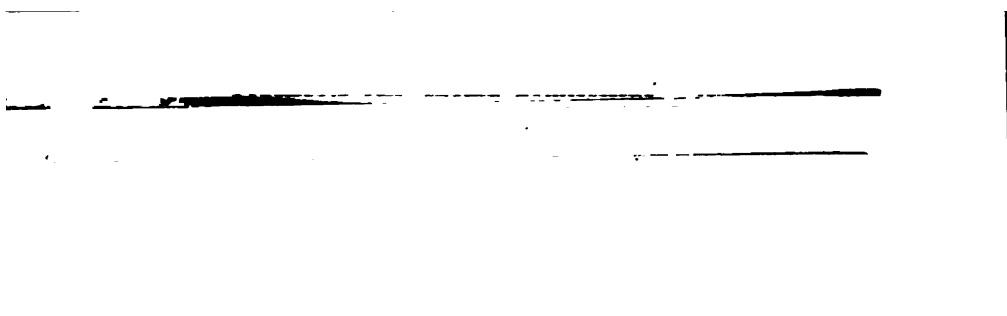
carrying oil, gas, or water. When it is remembered that this barren portion of the sand has a minimum porosity of probably not less than 5 per cent of its volume, and in most cases probably as much as 10 per cent, the explanation of the occurrence of oil and gas exclusively in certain thin porous portions of the sand becomes very difficult.

In a few wells in the vicinity of No. 141 oil was obtained in the Gordon, the Fourth, and the Fifth sands, but the pools in the last two seem to be very small. In well No. 140 the Gordon and the Fourth sands were found to be gas bearing at depths of 3 and 5 feet, respectively, in the sands, and an oil pay streak was found near the bottom of the Fifth sand 49 feet from the top.

In the northern portion of the Moon Run field, near wells Nos. 132 and 135, the Fifth sand, which is the principal oil-bearing bed, is from 40 to more than 50 feet thick. In a few wells this sand carries two pay streaks, one near the top and another near the bottom, but the lower pay is far more extensive as well as more productive than the upper. In this pay streak the oil occurs from 30 to 50 feet below the top of the sand.

In the Martin Clever No. 6 well (No. 132) and in another well on the Charles Arbuckle property about 500 feet farther north, the Fifth sand is the producing sand. These two wells are surrounded on all sides by dry holes in the Fifth, but two locations southwest of this pool the Fifth again is oil bearing. From this point northeast to Ohio River the Gordon and the Fifth sands rarely carry oil, but in many wells they have produced large quantities of gas. In that direction the Fourth sand is oil bearing and has supplied some of the best wells found in this field. Well No. 131, which is known as Speer No. 1, produces oil from the Fourth sand, which here has a thickness of 52 feet. The first oil was found in it 31½ feet below the top of the sand, the pay streak extending to the bottom of the sand, a distance of 20½ feet. The well began flowing at the rate of 250 barrels a day when the pay streak had been penetrated to a depth of 15 feet. This is another instance of a portion of a sandstone being saturated by oil and gas under great pressure, whereas associated portions appear to show little or no oil or gas. The theory which fully satisfies the facts as they are found by the drill must provide an explanation of this phenomenon.

North of well No. 131 the oil in the Fourth sand is replaced by gas in well No. 9 on the Ewing farm (No. 121). Thence north to Ohio River the Fourth sand is gas bearing in nearly all the wells drilled to that horizon. Northeast of well No. 131 the Fourth sand oil pool pinches out entirely south of well No. 130. This well found oil and gas in the Fifth sand and flowed at the rate of 40 barrels per hour. In this well the upper 6 feet of the Fifth sand are gray; the next 6 feet are white. Oil was found 12 feet from the top of the sand, in a softer,



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apparently more porous part of the sand which extended to the bottom of the bed, a distance of 28 feet. These conditions in the Fifth sand are similar to those pointed out in the Fourth sand in well No. 131. Gas was also encountered in the Gordon Stray sand 24 feet below the top in well No. 130. In well No. 129 a show of oil was encountered in the Fifth sand, 14 feet below the top, and another better one 40 feet below the top and 7 feet from the bottom of the sand. No gas was recorded in this well.

Wells Nos. 127 and 128 obtained gas in the Fourth sand 9 and 10 feet, respectively, below the top, and in No. 128 a second pay streak of gas was encountered 20 feet below the top of the sand. No. 127 found a showing of oil in the Fifth sand, 30 feet below the top and 5 feet from the bottom.

On Neville Island well No. 126, on the Bragdon property, found salt water in "shaly slate" 87 feet above the top of the Hundred-foot sand, in which sand oil and gas were found 61 feet below the top. A show of oil was also found in the Fifth sand in this well.

In well No. 125, on the Hamilton farm, two pay streaks of gas were encountered in the Gordon sand 5 and 10 feet, respectively, below the top. Well No. 124 on the A. P. Cole property found oil in the Hundred-foot sand 27 feet below the top, with gas in the Gordon sand 10 feet below the top. In well No. 121 south of Neville Island oil was found in the Hundred-foot sand at 10 and 45 feet below the top of the sand. Gas also occurs in the Fourth sand in this well 42 feet below the top of the sand. In well No. 122 oil in the Hundred-foot occurs 40 feet below the top, with gas in the Fourth 38 feet below the top of the sand. Practically the same conditions as described above obtain in the majority of the wells of this field. In No. 121 the first oil was found 30 feet in the Hundred-foot sand with an 8-foot pay streak. Gas occurs in both the Fourth and the Fifth sands in this well (No. 121) at depths of 4, 3, and 8 feet, respectively. In well No. 116 oil was found in the Hundred-foot sand at 38 feet, oil and salt water at 43 feet, and oil at 47 feet below the top of the sand; in this well the Gordon, the Fourth, and the Fifth sands are unproductive. In well No. 118 the pay streak is 10 feet thick and extends from 47 to 57 feet below the top of the Hundred-foot sand and from 10 to 20 feet below a 15-foot shale "break" in the sand. Above this pebbly pay streak the driller reports 10 feet of fine white sand. The Third or Gordon sand in this well carries gas 5 feet from the top in a fine white sand. The Fourth and the Fifth sands are fine grained and show no oil, gas, or salt water. In well No. 119 two pay streaks in the Hundred-foot sand, 33 and 60 feet below the top, were both found to be "white and hard." In well No. 115 oil was found 28 and 45 feet below the top of the Hundred-foot sand in pay streaks 7 and 10 feet thick; the lower of these pay streaks carries salt water with the oil. In this well both

the Fourth and the Fifth sands are gas bearing, the Fourth with two pay streaks 13 and 23 feet below the top, and the Fifth with one pay streak 16 feet below the top of the sand. The conditions shown to prevail in the oil sands in these wells are found to extend over most of the Moon Run field southwest of well No. 117. The oil in the vicinity of wells Nos. 120, 114, and 113 comes mainly from the Hundred-foot sand, though the Fourth sand is productive in one or more wells on the Magnuss Heirs farm. Well No. 112 is in the Ewings Mill field and obtains gas from the Nineveh Thirty-foot and the Gordon sands. This Hundred-foot oil pool extends for some distance south of Beacon and possibly overlaps the Fifth sand pool in the McCurdy field.

In some of the wells of this area the Nineveh Thirty-foot sand furnishes oil, and the Fourth and Fifth sands are gas bearing. Spirit level lines were run to most of the wells of this area and the elevation above sea level of the top of the casing in each of them was determined, but diligent search failed to furnish a single record of the wells, and hence nothing of value regarding the condition of the sands is available.

The following table of records gives some idea of the stratigraphic conditions of the oil sands in these two townships:

*Partial records of deep wells in Robinson and Stowe townships, Allegheny County, Pa.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
			<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>	
112	E. M. Ewing...	Philadelphia Co..	767	Hundred-foot sand.	1,423	77	Depth of well, 1,975 feet.
				Thirty-foot sand	1,595	10	Gas at 1,600 feet.
				Stray sand	1,697	6	
				Gordon sand	1,725	15	Gas at 1,735 feet.
				Fourth sand	1,778	17	
113	J. McElhern No. 1.	A. G. Davis.....	1,086	Hundred-foot sand.	1,753	80	Oil at 1,759 and 1,767 feet.
				Fourth sand	2,074	16	Depth of well, 2,129 feet.
				Fifth sand	2,120		
114	Magnus heirs No. 1.	.....do.....	1,080	Hundred-foot sand.	1,736		Depth of well, 2,060 feet.
				Gordon sand	1,996		Coal and water at 640 feet.
				Fourth sand	2,049		Pay at 2,055 feet.
115	Gibson No. 3...	S. D. Robison....	1,145	Hundred-foot sand.	1,775	109	Depth of well, 2,200 feet; oil at 1,903 and 1,820 feet.
				Thirty-foot sand	1,943		
				Gordon sand	2,034	45	
				Fourth sand	2,100	38	Gas at 2,113 and 2,123 feet.
				Fifth sand	2,165	33	Gas at 2,181 feet.
116	A. B. Speer No. 2.	.....do.....	1,142	Hundred-foot sand.	1,803	117	Oil at 1,841, 1,846, and 1,850 feet; water at 1,846 feet; depth of well, 2,257 feet.
				Thirty-foot sand	1,978		Dry.
				Gordon sand	2,071	42	Do.
				Fourth sand	2,137	30	
				Fifth sand	2,200	25	
117	Gibson No. 1...	.....do.....	1,087	Hundred-foot sand.	1,719		Depth of well, 1,788 feet; oil and water at 1,765 feet; bottom of pay, 1,777 feet.

*Partial records of deep wells in Robinson and Stowe townships, Allegheny County, Pa.—*  
Continued.

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth of top.	Thick-ness.	Remarks.
			<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>	
118	Gibson No. 1..	Laughner & Wally.	878	Hundred-foot sand. Thirty-foot sand Third sand..... Fourth sand..... Fifth Stray..... Fifth sand.....	1,528 1,700 1,783 1,841 1,875 1,925	112 34 30 24 12 30	Depth of well, 1,975 feet; oil at 1,575-1,585 feet. Gas at 1,788 feet.
119	Matchett No. 2.	S. D. Robison....	1,049	Hundred-foot sand.	1,671	.....	Depth of well, 1,750 feet; first pay at 1,704 feet; bottom second pay at 1,735 feet.
120	N. Nolte.....	South Penn Oil Co.	.....	.....do.....	1,530	.....	Depth of well, 1,582 feet; pay at 1,533-1,542 feet.
121	Ewing No. 9...	S. D. Robison....	1,035	Big Injun sand.. Hundred-foot sand. Thirty-foot sand Fourth sand..... Fifth sand.....	1,000 1,700 1,852 2,020 2,108	..... 112 ..... 60 16	Depth of well, 2,155 feet. Oil at 1,730-1,738 feet; bottom of Gordon sand at 1,985 feet. Gas at 2,063-2,073 feet. Gas at 2,116 feet.
122	Michael No. 1..	.....do.....	1,055	Hundred-foot sand. Fourth sand....	1,684 2,002	..... .....	Oil at 1,724 feet. Gas at 2,040 feet.
123	Leech No. 2....	.....do.....	1,115	Hundred-foot sand. Fourth sand....	1,715 2,004	120 .....	Depth of well, 2,115 feet; oil at 1,725 and 1,760 feet; gas at 2,108 feet.
124	A. P. Cole No. 3	.....do.....	738	Big Injun sand.. Squaw sand..... Hundred-foot sand. Gordon sand.... Fourth sand.... Fifth sand.....	627 926 1,343 1,588 1,604 1,730	..... 189 108 ..... ..... .....	Depth of well, 1,777 feet. Oil at 1,370 feet. Gas at 1,598 feet.
125	Hamilton heirs No. 1.	.....do.....	727	Salt sand..... Hundred-foot sand. Thirty-foot sand Gordon sand.... Fifth sand.....	1,181 1,321 1,490 1,580 1,729	99 114 ..... ..... 33	Depth of well, 1,782 feet. Gas at 1,585 feet; more gas at 1,590 feet.
126	Bragdon.....	J. H. Galey et al..	720	Sand..... Hundred-foot sand. Sand..... Sand, pebbly....	425 1,327 1,619 1,771	5 122 31 10	Salt water. Gas and oil at 1,388 feet. Gas. Oil, show.
127	Pressed Steel Car Co. No. 3.	Pressed Steel Car Co.	732	Big Injun sand.. Salt sand..... Hundred-foot.. Gordon sand (?) Fourth sand.... Fifth sand.....	590 1,250 1,360 1,600 1,699 1,750	420 ..... ..... ..... 25 35	Little gas and water. Show of oil at 1,780 feet.
128	Pressed Steel Car Co. No. 1.	.....do.....	731	Big Injun sand.. Squaw sand.... Salt sand..... Hundred-foot.. Thirty-foot sand Gordon sand.... Fourth sand....	585 730 1,013 1,384 1,551 1,601 1,715	105 165 ..... 96 30 79 7	Water at 1,250 and 1,263 feet. Water at 1,440 feet. Gas.
129	Nichol No. 3...	S. D. Robison....	1,098	Injun sand..... Squaw sand..... Hundred-foot sand. Thirty-foot sand	1,005 1,405 1,774 1,930	275 ..... 106 .....	Depth of well, 2,205 feet.

*Partial records of deep wells in Robinson and Stowe townships, Allegheny County, Pa.—*  
Continued.

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
			<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>	
129	Nichol No. 3...	S. D. Robinson	1,098	Gordon sand.....	1,988		
				Fourth sand.....	2,090		
				Fifth sand.....	2,141	33	Show of oil at 2,155 feet; good show at 2,188 feet.
130	Nichol No. 2.....	do.....	1,110	Injun sand.....	985	280	
				Squaw sand.....	1,325	60	
				Gas sand.....	1,600	103	Water at 1,633 feet.
				Hundred-foot sand.....	1,740	110	
				Thirty-foot sand.....	1,910	34	
				Stray sand.....	1,969	28	Gas at 1,993 feet.
				Gordon sand.....	2,006	21	
				Fourth sand.....	2,062	33	
				Fifth sand.....	2,129	40	Oil and gas at 2,141 feet; oil flowing 40 barrels per hour at 2,147 feet.
131	Speer No. 1.....	do.....	1,150	Fourth sand.....	2,130	52	Oil at 2,162 feet; increased flow at 2,170 feet; 250 barrels per day at 2,175 feet.
132	M. Clever.....	Philadelphia Co.	1,148	Hundred-foot sand.....	1,815	110	Depth of well, 2,253 feet.
				Thirty-foot sand.....	1,976	35	
				Gordon sand.....	2,042	66	
				Fourth sand.....	2,138	45	
				Fifth sand.....	2,203	43	Oil.
133	D. K. Clever No. 6.	South Penn Oil Co.	1,201	Pittsburg coal.....	52		Depth of well, 2,314 feet.
				Stray sand.....	2,122		Oil at 2,164 feet.
				Gordon sand.....			
				Fourth sand.....	2,222	12	Oil, 50 barrels per day at 2,294 feet; 60 barrels per hour at 2,300 feet.
				Fifth sand.....	2,272		
134	A. P. Clever No. 10.	do.....	1,199	Gordon sand.....	2,139		Depth of well, 2,321 feet.
				Fourth sand.....	2,206		Oil at 2,298 feet.
				Fifth sand.....	2,267	45	
135	J. Speer.....	do.....	977	Fourth sand.....	2,007	9	Depth of well, 2,042 feet.
136	D. K. Clever No. 9.	do.....	1,128	Hundred-foot sand.....	1,800	120	
				Gordon sand.....	2,050	50	
				Fourth sand.....	2,145	33	
				Fifth sand.....	2,193	45	Oil at 2,238 feet.
137	A. P. Clever No. 4.	do.....	1,004	Gordon sand.....	1,913		Depth of well, 2,103 feet.
138	A. P. Clever.....	do.....	976	do.....	1,932	56	Show of oil; depth of well, 2,113 feet.
				Fourth sand.....	2,018	15	
				Fifth sand.....	2,085	26	Pay, between 2,087 and 2,091 feet; 18 barrels daily.
139	D. K. Clever No. 4.	do.....	1,089	Gordon sand.....	2,050	10	Soft pebbly.
140	D. K. Clever.....	do.....	1,042	do.....	2,005	18	Depth of well, 2,204 feet; gas at 2,008 and 2,090 feet.
				Fourth sand.....	2,085	22	Oil at 2,195 feet.
				Fifth sand.....	2,145	48	
141	P. Portman No. 2.	do.....	1,155	Gordon sand.....	2,164	59	Oil at 2,172 feet.
				Fourth sand.....	2,250	17	Oil at 2,252 feet.
				Fifth sand.....	2,312	31	Oil at 2,355 feet.
142	P. Portman.....	Forest Oil Co.	1,138	Pittsburg coal.....	40		
				Third sand.....	2,128	27	No show of oil or gas until 10 feet in sand.
143	P. Petrie.....	South Penn Oil Co.	1,157	do.....	2,152		Depth of well, 2,171 feet; oil at 2,155 to 2,164 feet.
144	Nichols heirs.....	do.....	1,207	Gordon sand.....	2,198	20	Oil at 2,200 feet; top and bottom of sand good.

*Partial records of deep wells in Robinson and Stowe townships, Allegheny County, Pa.—*  
Continued.

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
145	John Palmer.	South Penn Oil Co.	<i>Feet.</i> 1,192	Fifth sand.....	<i>Feet.</i> 2,379	<i>Feet.</i> 11	Depth of well, 2,390 feet.
146	Adams No. 2....	.....do.....	1,165	.....do.....	2,260	.....	Depth of well, 2,270 feet; oil at 2,265 feet.
147	A. A. Daugherty No. 3.	.....do.....	1,156	Fifth sand.....	2,299	10	Depth of well, 2,309 feet.
148	L. Shaffer.....	.....do.....	1,153	Pittsburg coal.....	73	.....	Salt water at 1,050 feet.
				Salt sand.....	1,000	208	
				Big Injun sand..	1,240	250	
				Hundred-foot sand.	1,970	66	
				Gordon sand.....	2,183	25	
				Fifth sand.....	2,313	18	Gas and oil at 2,317 feet.
149	H. Shaffer.....	.....do.....	1,076	.....do.....	2,215	29	
150	A. Tidball.....	.....do.....	1,140	Pittsburg coal.....	65	.....	Oil at 2,308 feet; poor well.
				Fifth sand.....	2,304	24	
151	Kelso No. 3....	J. J. Showalter...	1,155	.....do.....	2,297	4	

## PITTSBURG AND VICINITY.

Under this heading is included that portion of the city of Pittsburg lying west of the eightieth meridian, and the townships and boroughs of Chartiers, Greentree, Union, and West Liberty, south of Ohio River, and a large portion of Bellevue and Allegheny townships and the southern part of Ross Township, north of the river.

Within this area a large number of deep wells have been drilled. Some of these wells have furnished varying amounts of both oil and gas, but no very extensive fields have been developed. Though Pittsburg is the center of one of the most important manufacturing districts in the United States, the area immediately adjacent to this city is of little value as regards the production of oil and gas, and will therefore be given little attention in this report. Many manufacturers in this city have attempted to secure cheap fuel for their plants by sinking deep wells on their properties in search of natural gas. In most of these wells gas was encountered at one or more horizons, often in sufficient quantities to justify the expense of the effort. In many wells, however, salt water accompanied the gas or was found to be so closely associated with it that the supply diminished rapidly and the wells were soon abandoned. In gathering material for the present report no attempt was made to locate on the map the abandoned holes nor to establish the position of many of those that are still producing, since the time and money necessary to do this work thoroughly were not available, and it is doubtful if the geologic and economic value of the material thus obtained would in any case justify the expenditure necessary to secure it.

A number of records of wells drilled within the city of Pittsburgh have been published by the Pennsylvania State Geological Survey,<sup>a</sup> together with descriptions of the locations of these wells, to which the reader is referred. Most of these wells have long since been abandoned and in most cases their locations have been obliterated, so that their positions on the map can now be only approximated. Some of the geologic facts brought out in the earlier reports are of sufficient importance to justify reprinting here.

In 1884-85 Messrs. Jones & Laughlin, of the American Iron & Steel Works, drilled a well<sup>a</sup> (No. 156 on map) on their property on the south bank of Monongahela River and on the east side of Twenty-sixth Street, twenty-fifth ward, Pittsburgh. This well was sunk to a depth of 3,000 feet, and encountered shows of gas at 360, 510, 1,525 to 1,618, 1,789, and 1,804 feet below the surface. The first three of these shows were accompanied by salt water and were soon exhausted. A good flow of gas was encountered at 1,789 feet and a better one at 1,804 feet from what is very probably the Gordon sand. The last flow came from a pebbly pay streak not over 2 feet in thickness. This well was cased to a depth of 1,720 feet and was subsequently filled up to a depth of 1,870 feet; tubing was inserted to pump off the salt water which accumulated with the gas and showed that some of the sands between 1,720 and 1,870 feet were also water bearing. The gas at 1,525 to 1,618 feet comes from either the Murrys ville sand or the Hundred-foot sand. It was reported as foul smelling and as being accompanied by considerable quantities of salt water. This water made its appearance as soon as the sand was touched by the drill. When the well was 10 feet in the sand the water stood 400 feet deep and a day later flowed 5 gallons per minute from the mouth of the well. This water had a temperature of 66.2° F. 5 feet below the mouth of the well, with a specific gravity of 1.075 at 59° F. In this well a small amount of salt water was encountered at a depth of 2,400 feet, which is probably more than 450 feet below the Fifth sand. This is the greatest depth at which water has been reported within the Carnegie quadrangle.

In May, 1885, Messrs. Jones & Laughlin completed their second well, about 600 yards east of No. 1. This well found a "pocket" of gas in a coal seam at a depth of 480 feet, and another at 710 feet, which had sufficient pressure to cause the water to flow from the hole. The salt-water sand, which is either the Murrys ville or the Hundred-foot, was struck in this well at a depth of 150 feet. At 1,517 feet, 400 feet of water stood in the hole. When a depth of 1,535 feet was reached<sup>b</sup> the muddy, foaming water began to flow over the mouth of the well, though there was hardly sufficient gas to ignite. At

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<sup>a</sup> Ann. Rept. Second Geol. Survey, Pennsylvania, vol. 14, 1886, pt. 2.

<sup>b</sup> Ann. Rept. Second Geol. Survey, Pennsylvania, 1886, pt. 2, p. 736.

1,551 feet the water flowed intermittently, sometimes resting for several hours and settling down 50 feet or more below the casing head. At 1,585 feet the water gained new strength and increased with each screw down to the bottom of the sand at a depth of 1,606 feet. "Temperature of water<sup>a</sup> 68° F.; specific gravity at 59° F. = 1.0725. Water very clear. One pint of water (United States standard) at 59° F. (15° C.) weighs 1 pound 1 ounce 13 drams. One pint of water (United States standard) yields on evaporation to perfect dryness 1 ounce, 13 drams of salty residue."

This well was cased to 1,610 feet, completely shutting off the salt water mentioned above. No salt water or gas occurs from 610 to 1,698 feet, where a small flow of gas was found in what is probably the Nineveh Thirty-foot sand. At 1,705 feet a small quantity of salt water was encountered. At a depth of 1,792 feet a large flow of gas was struck in the top of what is considered to be the Gordon sand, which blew out the salt water and drillings, but the well later filled up 600 feet with water, which upon being agitated by the tools was blown from the well by the gas. It is not known positively whether this water came from the Nineveh Thirty-foot or the Gordon sand, but it appears to have come from both.

The same salt-water conditions were found to obtain in many of the wells drilled in this area. Boyd Hill well, drilled in 1876-77, was located at the south end of Boyd Hill, opposite the Pittsburgh Steel Works, on the north side of Monongahela River. In this well<sup>b</sup> the great salt water sand of this area, which is probably to be correlated either with the Murrysville or the upper portion of the Hundred-foot sand, was struck at a depth of 1,585 feet; it is 112 feet thick. This sand was found to be completely saturated with salt water under pressure sufficient to cause it to flow out of the well mouth at the rate of 3,000 to 4,000 barrels a day. It contained 11 per cent salt, and it is said that 348 gallons of water made 280 pounds of salt and 60 pounds of "bittern." It contained 0.31 per cent bromine and is said to have had a "strong fishy smell." It is said that the water from this well did not spout intermittently, as from gas pressure, but flowed a steady stream over the casing head. In this well a show of oil and gas was found in a loose gray sand at 2,117 feet, which is probably the Fifth sand. Attention should also be called to the fact that salt water was encountered in this well at a depth of 587 feet, which is only about 430 feet below low-water mark in the Ohio River at this place. This salt-water sand outcrops at the surface of the Ohio River in the vicinity of Freedom only a few miles down the river from Pittsburgh, and is reported as a fresh-water sand at many intermediate points. A complete section of this well (No. 157) is shown on Plate II (p. 11).

<sup>a</sup> From notes of Mr. F. T. Cretton, then chemist for Jones & Laughlin steel plant.

<sup>b</sup> For complete description of this well see vol. 5, Second Geol. Survey Pennsylvania, Appendix E, p. 217.



The foregoing statement of the salt-water conditions in the sands of this vicinity has been made not on account of any special economic value being attached to these facts, but because of the possible use to which they may be put in theoretical studies of oil and gas accumulation. Similar conditions to those described above are found in many of the wells drilled within the city. One of the deepest of these wells was put down for brine and gas by the John A. Beck Salt Co. on the property of that company, north side of Pittsburg. A complete record of this well (No. 159) is given on pages 11-12 of this report. This well penetrated to a depth of 4,089½ feet. No mention is made in the record of the salt-water conditions in it nor of the relative amount and closed pressure of the gas which was found at 1,655 and 1,930 feet from the top in what are probably the Nineveh Thirty-foot and Fifth sands, respectively.

Well No. 160 obtained gas in the Fifth sand. In No. 161 the Hundred-foot sand flowed oil and gas from a 10-foot pay streak located 10 feet below the top of the sand. A small amount of gas also came from the Nineveh Thirty-foot sand, 5 feet below the top, and a little from a pay streak 12 feet in the Gordon sand. The strong flow, however, comes from a 9-foot pay streak in the Fifth sand, 20 feet below the top.

*Bellevue oil and gas field.*—Only the southern part of the Bellevue oil and gas field is included in the Carnegie quadrangle. This field at one time covered most of the territory upon which Bellevue now stands and extended northwest for some distance into the Sewickley quadrangle. Oil and gas were found principally in the Hundred-foot and the Nineveh Thirty-foot sands. Some of the early wells in this field are said to have produced at the rate of several hundred barrels per day, but these have long since been exhausted and abandoned or else reduced to a production of only a few barrels per day. Many of the locations of these wells were obliterated by the rapid subsequent growth and improvements of the town. Within the last 10 years a number of wells have been sunk in the extension northeast of the Nineveh Thirty-foot sand pool. Some of these wells are still pumping, and are shown on the map southeast of well No. 162. This well found two pay streaks containing oil with some salt water in the Hundred-foot sand; these are 34 and 41 feet below the top of the sand. Gas was also encountered in the Nineveh Thirty-foot at a depth of 6 feet in the sand. The Fourth and Fifth sands are here 25 and 17 feet thick, respectively.

In the vicinity of well No. 163 on the Peter Ivory farm a small pool of oil and gas was found in the Hundred-foot sand, but the supply was quickly exhausted, and the wells were soon abandoned. The pay streak in this sand is from 33 to 35 feet below the top of the sand. Salt water in varying amounts accompanies the oil and gas in this

field. Spirit-level lines were run to most of the wells in this field, and their elevations above sea level were determined, but a diligent search for records proved unsuccessful, and the data relative to them are therefore very meager.

*Chartiers oil and gas field.*—This field is located on Chartiers Creek, about 1 mile southwest of McKees Rocks. It is partly in Stowe and partly in Chartiers townships, and in reality consists mainly of a northeast extension of the Gordon sand pool from the vicinity of Moon Run. Though most of the oil in this field comes from the Gordon sand, both oil and gas have been obtained from the Hundred-foot sand.

Well No. 2 on the Luke May farm (No. 154) found the Gordon sand 30 feet thick, with the top of the first pay streak 15 feet in the sand. In well No. 1, on the same farm (No. 153), the Hundred-foot sand carries oil 15 feet below the top, with two pay streaks in the Gordon sand 10 and 19 feet below the top. In well No. 155 on the Petrie farm the pay streak in the Hundred-foot sand is 36 feet below the top. No mention is made in the record of a pay streak in the Gordon sand, which is here 54 feet in thickness and is doubtless productive. In other wells of this field, on the McKee heirs, Johnston, and Scully farms, most of which are now owned by the Granite Improvement Co., the pay streak in the Gordon sand varies from 4 to more than 17 feet below the top, but the records furnish no data relative to the thickness and the amount of oil and gas secured from the sand.

Southeast of the Chartiers field the sands appear to be unusually barren of both oil and gas. Two or three small gas wells in the Fifth sand southeast of Ingram and Idlewood seem to be all that have proved even partly successful. Diligent inquiry in the field failed to discover any deep holes in either Union or West Liberty boroughs, though it seems hardly possible that an area of this size, situated so near Pittsburgh, could have escaped the inquisitiveness of the operator.

*Records of wells in Pittsburgh and vicinity.*—The following table gives records of wells in and near Pittsburgh:

*Partial records of deep wells in Pittsburgh and vicinity.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
152	McKee heirs...	South Penn Oil Co.	<i>Feet.</i> 748	Gordon sand....	<i>Feet.</i> 1,722	.....	Oil at 1,728 to 1,730 feet; depth of well, 1,750 feet.
153	Luke May No. 1.	A. G. Davis.....	750	Hundred-foot sand. Third sand.....	1,525 1,766	..... 30	Depth of well, 1,800 feet; oil at 1,540 feet; oil at 1,776 and 1,785 feet.
154	Luke May No. 2.	.....do.....	.....	Hundred-foot sand. Third sand.....	1,521 1,730	..... 30	Depth of well, 1,774 feet. Pay at 1,754 feet.

*Partial records of deep wells in Pittsburg and vicinity—Continued.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
155	John Petrie No. 1.	Forest Oil Co.....	<i>Feet.</i> 733	Hundred-foot sand.	<i>Feet.</i> 1,495	<i>Feet.</i> .....	Depth of well, 1,920 feet.
160	.....	American Locomotive Co.	756	Gordon sand.....	1,741	55	
				Big Injun sand.....	745	.....	
				Squaw sand.....	830	.....	
				Salt sand.....	1,360	.....	
				Hundred-foot sand.	1,469	.....	
				Thirty-foot sand	1,660	.....	
				Gordon sand.....	1,753	.....	
				Fifth sand.....	1,869	.....	Gas.
161	Gas well No. 2.	Pittsburg Forge & Iron Co.	724	Big Injun sand.....	630	250	Bottom of well, 1,790 feet.
				Squaw sand.....	920	110	
				Salt sand.....	1,250	110	
				Hundred-foot sand.	1,380	122	Oil and gas.
				Thirty-foot sand	1,554	31	Small gas.
				Third sand.....	1,660	18	Little gas.
				Fourth sand.....	1,706	37	Nothing; rock very hard.
				Fifth sand.....	1,768	.....	Strong gas at 1,790 feet.
162	G. Orth No. 4.	.....	.....	Hundred-foot sand.	1,538	88	Depth of well, 1,956 feet; first pay at 1,572 feet; second at 1,579 feet; gas at 1,710 feet.
				Thirty-foot sand	1,704	.....	
				Third sand.....	1,800	.....	
				Fourth sand.....	1,875	25	
				Fifth sand.....	1,933	17	
163	P. Ivory No. 1.	Rudolph Schmitt	1,059	Hundred-foot sand.	1,600	.....	Depth of well, 1,636 feet; gas at 1,633 feet; oil at 1,634 feet; producing sand 2 feet thick.
164	Moses Chess heirs.	Philadelphia Co..	1,059	.....do.....	1,890	34	Depth of well, 2,281 feet.
				Fourth sand.....	2,170	15	
				Fifth sand.....	2,250	21	Gas at 2,251 feet.
165	J. Carlin.....	.....do.....	987	Gordon sand.....	2,025	40	Depth of well, 2,348 feet.
				Fourth sand.....	2,100	15	

**COLLIER, SCOTT, AND BALDWIN TOWNSHIPS, ALLEGHENY COUNTY.**

These three townships form a tier across the central portion of the quadrangle east of North Fayette and South Fayette townships.

The oil-producing territory of these townships appears to be limited in Collier Township to a small area in the extreme northwestern part of the township included in the McDonald field and a few scattered wells near Rennerdale, and to a small pool at Woodville, on the border of Scott and Collier townships. Small pools of gas, none of great importance, occur at a number of places, though occasionally a good flow is secured. Both the oil and the gas pools are erratic in occurrence, due apparently to the varying condition of the sands and pay streaks in the different places.

*McDonald oil and gas field.*—The Fifth sand oil pool of the McDonald field extends across the northwest corner of Collier Township. The best wells were found in the southern part of this productive area

on the John Mertz farm, one of which showed an initial flow of 1,400 barrels per day. This is the best well yet found in Collier Township. In a few wells the Hundred-foot sand is said to furnish a little gas. So far as could be learned, the Gordon and the Fourth sands, although somewhat below normal thickness, are fairly constant, but contain no oil, gas, or salt water. The Fifth sand is said to furnish a small amount of salt water in the northern portion, but toward the southwest, where oil production was greatest, no water is found in this sand. The Hundred-foot sand appears to be water bearing throughout the entire area.

The thickness of the Fifth sand is fairly uniform over this part of the McDonald field. In wells Nos. 167, 168, and 169 it is 24, 40, and 27 feet, respectively. The pay streaks in wells Nos. 166, 167, and 169 are 14, 9, and 18 feet, respectively, below the top, in No. 167 both oil and gas being found at 9 feet in the sand.

The oil wells in the vicinity of Rennerdale appear to produce principally from the Hundred-foot sand, though in some of them the oil is said to come from the Gordon sand. In well No. 170 the oil occurs in a pay streak of the Hundred-foot sand 51 feet below the top. This pay streak is said also to furnish more or less salt water with the oil.

Small pools of gas represented by one or two producing wells occur at various places in Collier Township. The elevations above sea level of most of these wells were determined and their positions were indicated on the map (Pl. IV), but few records and very little other data relative to them could be secured. Most of these wells were drilled for oil, but proving to be failures for that purpose were utilized for gas wherever the supply justified the cost of keeping them attached to a pipe line. The pools in all the sands of this vicinity seem to be small, and for this reason the territory does not appear to justify careful exploitation for its gas supply, the chances being that more money would be expended in drilling wells than would be obtained from the sale of the gas.

In well No. 171 gas was found in the Nineveh Thirty-foot sand; in well No. 172 the pool is in the Fourth sand. No mention is made of the producing sand in the record of well No. 173. It should be noted, however, that the sands in this well have the following thickness: Hundred-foot, 110 feet; Nineveh Thirty-foot, 22 feet; Gordon, 45 feet; Fourth, 20 feet; and Fifth, 13 feet—only the Fifth sand being below normal thickness.

The following table gives partial records of wells in Collier Township:

*Partial records of deep wells in Collier Township, Allegheny County, Pa.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
166	J. Cowan No. 4.	Forest Oil Co. . . . .	Feet. 1,204	Pittsburg coal. . . . . Fifth sand. . . . .	Feet. 120 2,362	Feet. ..... .....	Depth of well, 2,382 feet. Oil at 2,377 feet.
167	A. Mertz. . . . .	South Penn Oil Co. . . . .	1,162	.....do. . . . .	2,316	24	Gas and oil at 2,325 feet.
168	McMichael. . . . .	J. J. Showalter. . . . .	1,009	.....do. . . . .	2,164	40	
169	Louisa Kelso No. 2.	Forest Oil Co. . . . .	1,075	.....do. . . . .	2,238	27	Oil and gas at 2,256 feet; 20 barrels per hour per day from Fifth sand.
76	Mary Gordon No. 1.	.....	1,047	Pittsburg coal. . . . . Salt sand. . . . . Hundred-foot sand. . . . . Thirty-foot sand. . . . . Gordon Red sand. . . . . Gordon White sand. . . . . Fourth sand. . . . . Fifth sand. . . . .	68 960 2,005 2,122 2,190 2,211 2,285 2,340	..... ..... ..... ..... ..... ..... ..... .....	Depth of well, 2,350 feet.
170	A. B. Miller No. 1.	.....	896	Big Injun sand. . . . . Hundred-foot sand. . . . .	970 1,797	..... .....	Depth of well, 1,859 feet; gas at 1,225 feet; oil at 1,849 feet.
171	J. A. Ewing. . . . .	Philadelphia Co. . . . .	987	.....do. . . . . Thirty-foot sand. . . . .	1,845 2,009	9 .....	Gas.
172	J. Clark. . . . .	.....do. . . . .	801	Hundred-foot sand. . . . . Gordon Stray sand. . . . . Fourth sand. . . . .	1,765 1,975 2,100	100 50 15	Depth of well, 2,115 feet. Producing.
173	F. B. Nimick. . . . .	.....do. . . . .	8,504	Big Injun sand. . . . . Squaw sand. . . . . Hundred-foot sand. . . . . Thirty-foot sand. . . . . Gordon sand. . . . . Fourth sand. . . . . Fifth sand. . . . .	1,120 1,485 1,842 2,010 2,080 2,160 2,220	300 80 110 22 45 20 13	Depth of well, 2,255 feet.
174	Allegheny County Home No. 2.	.....	808	Salt sand. . . . . Big Injun sand. . . . . Squaw sand. . . . . Hundred-foot sand. . . . . Thirty-foot sand. . . . .	900 1,140 1,420 1,855 2,015	145 240 130 95 50	Depth of well, 2,100 feet. Oil and water at 1,910 feet. Oil at 2,025 feet; gas at top of sand.
175	Jno. McKeown	Philadelphia Co. . . . .	897	Salt sand. . . . . Big Injun sand. . . . . Hundred-foot sand. . . . .	1,023 1,155 1,930	92 300 210	Depth of well, 2,140 feet.

*Woodville oil and gas field.*—In the Woodville field the Nineveh Thirty-foot sand produces most of the oil and gas, though the Hundred-foot sand furnishes some oil and gas, and good shows of gas are reported from the Salt sand. Well No. 174, on the property of the Allegheny County Home, was drilled in 1907. In this well the Hundred-foot sand is 95 feet thick, with the pay streak containing oil and salt water 55 feet below the top of the sand. The Nineveh Thirty-foot sand is here 50 feet thick, with gas in the top of the sand and oil 10 feet below. No record could be secured of the Joseph Campbell

No. 1 well, located about 200 feet southwest of the railroad station at Woodville. This is said to have been the pioneer well in this field and to have produced gas for four years from the Gordon sand, and later to have begun flowing oil at the rate of 100 barrels per day from that sand. It appears to be regarded as a freak well since others, drilled within 100 feet of it, are said to have furnished little or no oil or gas from the Gordon sand. Hearsay data must, however, be accepted with due allowance for such discrepancies as are likely to occur in evidence of this nature. In well No. 178 the Nineveh Thirty-foot sand furnishes oil from a pay streak 6 feet below the top, and in No. 179 the same sand was found to contain gas and oil 19 and 23 feet, respectively, below the top. In well No. 176 the Salt sand was found to contain a small amount of gas at a depth of 960 feet with salt water below, the Nineveh Thirty-foot sand furnishing both oil and gas at a depth of 2,110 feet. In several wells of this field the Salt sand carries more or less gas at the top with salt water below, which in well No. 185 was under sufficient pressure to send a stream of salt water over the top of the derrick. The Hundred-foot sand in this well (No. 185) is over 110 feet thick; it furnished a small amount of oil, gas, and salt water near the bottom. In this well the Hundred-foot sand is described as being reddish and somewhat limy; the Nineveh Thirty-foot sand is hard, reddish, and of poor quality; the Gordon sand seems to be represented only by "slate and shells;" the Fourth sand is only 5 feet thick; and the Fifth sand is 20 feet thick but dry. No salt water was encountered below the Hundred-foot sand. It should be especially noted, however, that salt water entered this well at the rate of 4 barrels per hour from a sandstone only 75 feet from the surface and less than 100 feet below the Pittsburg coal. Another salt water stratum was struck at 390 feet which furnished 10 barrels per hour. In the oil fields of southwestern Pennsylvania salt water is rarely reported at such shallow depths.

In well No. 177 the Hundred-foot sand is reported to have 25 feet of nice, soft, white sand, with large white pebbles, but to contain no oil or gas and only a little salt water. In this well the Nineveh Thirty-foot sand is 31 feet thick and furnishes gas. This field is now down to a settled production, furnishing a maximum of a few barrels per day from some of the best wells.

Northeast and east of the Woodville field the Nineveh Thirty-foot, the Hundred-foot, and the Gas sands furnish gas in a number of scattered wells. Careful inquiry, however, failed to locate the records of these wells or to secure other data relative to them.

*Castle Shannon gas pool.*—In the eastern part of Scott Township, in the vicinity of Castle Shannon, a gas pool of considerable size has been found in the Hundred-foot sand, which here has a thickness of about 100 feet. The gas comes from a pay streak below the "break" in this sand, in that portion designated farther south as the Fifty-foot

sand. Farther east, in the vicinity of well No. 181, the Gantz sand is thought to furnish the gas. In well No. 180 gas is also reported from a sand at a depth of 2,324 feet and at a distance of 309 feet below the top of the Gantz or Hundred-foot sands. This sand is considered by drillers to be the Gordon. In well No. 184, on the Boyd farm, this sand is said to have produced several barrels of oil, but the statement could not be verified. Most of the wells in this area were drilled several years ago and a number of them have been exhausted and abandoned.

*Records of wells.*—The following table gives records of wells in Scott and Baldwin townships:

*Partial records of deep wells in Scott and Baldwin townships, Allegheny County, Pa.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
176	J. Schnitt No. 1	J. L. Downing...	<i>Fect.</i> 888	Salt sand..... Big Injun sand.. Hundred-foot sand. Thirty-foot sand	<i>Fect.</i> 960 1,205 1,950 2,110	<i>Fect.</i> 150 275 .....	Show of gas; depth of well, 2,169 feet; water.  Oil and gas.
177	S. S. Nixon No. 1.	.....do.....	939  ±5	Salt sand (dry top). Big Injun sand.. Hundred-foot sand. Thirty-foot sand	1,080 1,250 1,970 2,134	50 50 105 31	1 barrel water per hour in bottom.  No oil or gas. Little gas.
178	Grossl.....	W. F. Sossong...	.....do.....	.....do.....	2,012	.....	Pay at 2,018 feet.
179	Sossong No. 1.	.....do.....	814	.....do..... Fifth sand.....	2,047 2,300	38 .....	Depth of well, 2,312 feet; gas at 2,066 feet; oil at 2,070 feet.
180	Roth No. 1....	Manufacturers Light & Heat Co.	1,053	Pittsburg coal... Gantz sand..... Fifty-foot sand..	105 2,015 2,040	..... ..... 45	Depth of well, 2,570 feet. Gas at 2,075 and 2,324 feet.
181	Cooley No. 1....	.....do.....	965	Pittsburg coal...	13	.....	Depth of well, 2,056 feet.
	Irwin No. 1....	.....do.....	946	Gantz sand..... Pittsburg coal...	1,940 30	..... .....	Gas at 2,025 feet. Gas at 1,995 feet; dry hole.
184	Boyd No. 1....	.....do.....	1,135	.....do..... Gantz sand..... Fifty-foot sand.. Fifth sand.....	210 2,100 2,140 2,412	..... ..... ..... .....	Depth of well, 2,604 feet. Gas at 2,150-2,200 feet.
185	W. Hope No. 1.	J. L. Downing...	.....	Gas sand..... Salt sand..... Big Injun sand.. Squaw sand..... Hundred-foot sand. Thirty-foot sand Gordon sand (?) Fourth sand (?) Fifth sand.....	848 890 1,135 1,415 1,865 2,030 2,180 2,200 2,285	..... ..... 50 125 ..... 30 ..... 20	No gas. Dry; at 900 feet large flow of gas; at 905-940 feet salt water. Show of oil at 1,975 feet; salt water and light gas. Dry.
186	Cale Bros. No. 1. <sup>a</sup>	Manufacturers Light & Heat Co.	1,187	Pittsburg coal... Gantz sand..... Fifty-foot sand.. Thirty-foot sand Fifth sand.....	235 2,190 2,225 ..... 2,470	..... ..... 18 ..... 16	Depth of well, 2,705 feet; salt water at 2,010 feet. Gas at 2,340 feet.

<sup>a</sup> This well is located about 1½ miles southeast of No. 181 and one-fourth mile northwest of Whitehal Chapel, about one-half mile off the quadrangle.

## UPPER ST. CLAIR TOWNSHIP, ALLEGHENY COUNTY.

*Bridgeville gas field.*—The Bridgeville gas field includes superimposed pools of gas in the Hundred-foot, Nineveh Thirty-foot, Gordon, Fourth, and Fifth sands. These pools are each apparently very small and do not form continuous productive areas over the entire field. Each sand in reality contains a series of small pools which apparently have very irregular outlines. The field extends into South Fayette Township on the west, and into Collier and Scott townships on the north. Few records of wells in this field were available; the ones obtained indicate that the field occupies the sloping crest of an arch projecting from the east toward the Nineveh syncline. The record of the well on the W. J. Fryer farm, No. 187, shows the Hundred-foot, Nineveh Thirty-foot, Third or Gordon, and Fifth sands to be gas bearing, the pay streaks being 42, 2, 50, and 4 feet, respectively, below the top of the sands. In No. 188 only the lower portion of the Hundred-foot sand was found to contain gas, the pay streak being 12 feet below the top. This well was drilled through the Fifth sand. The J. A. Bell No. 1 well (No. 189) found a little gas in the Nineveh Thirty-foot sand, 12 feet below the top, but the main volume came from two thin pay streaks in the Fourth sand, at the top and 5 feet below the top. The Hundred-foot, the Gordon, and the Fifth sands are of normal thickness in this well, but contain no oil, gas, or salt water. In the Charles Godwin No. 1 well (No. 200) all the sands are present in normal thickness, but only the Nineveh Thirty-foot and the Fifth are gas bearing. The Nineveh Thirty-foot sand contained only a small amount of gas in the top; the Fifth sand furnished the main supply from a pay streak 2 feet below the top. The utmost irregularity prevails regarding the location of the small pools in each of the sands. Many of these wells have been furnishing gas to the pipe lines for several years, and are said to hold up remarkably in the amount of production.

*Records of wells.*—The following table gives records of wells in the Bridgeville field:

*Partial records of deep wells in the Bridgeville gas field, Upper St. Clair Township, Allegheny County, Pa.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
187	W. J. Fryer...	Philadelphia Co..	<i>Feet.</i> 870 (?) ±10	Salt sand..... Blg Injun sand.. Hundred-foot sand. Thirty-foot sand Third sand..... Fourth sand..... Fifth sand.....	<i>Feet.</i> 1,050 1,264 2,005 2,181 2,243 2,322 2,376	<i>Feet.</i> 27 142 114 25 58 14 11	Depth of well, 2,424 feet. Gas at 2,047 feet.  Gas at 2,183 feet. Gas at 2,293 feet. Gas at 2,380 feet.



*Partial records of deep wells in the Bridgeville gas field, Upper St. Clair Township, Allegheny County, Pa.—Continued.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
			<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>	
188	R. H. Cook.....	do.....	816 (?)	Big Injun sand.....	1,071	13	Depth of well, 2,458 feet.
				Gantz sand.....	1,763	28	
				Fifty-foot sand.....	1,893	63	Gas at 1,805 feet.
189	J. A. Bell No. 1.....	do.....	967 (?)	Pittsburg coal.....	48	.....	
				Big Injun sand.....	1,145	277	
				Hundred-foot sand.....	1,900	100	
				Thirty-foot sand.....	2,065	24	Little gas at 2,077 feet.
				Gordon sand.....	2,128	56	
				Fourth sand.....	2,206	21	Gas at 2,206 to 2,211 feet.
				Fifth sand.....	2,274	18	No gas.
200	C. Godwin.....	do.....	986 (?)	Pittsburg coal.....	118	.....	Depth of well, 2,381 feet.
				Hundred-foot sand.....	1,979	105	
				Thirty-foot sand.....	2,143	21	Little gas at 2,143 feet.
				Gordon sand.....	2,203	60	
				Fourth sand.....	2,287	20	
				Fifth sand.....	2,353	14	Gas at 2,355 feet.

*Clifton gas field.*—This field is situated in the southeastern part of the township in the vicinity of Upper St. Clair. It has been developed by 20 or more wells, which found most of the gas in the Hundred-foot, Nineveh Thirty-foot, and Gordon Stray sands. One of these wells was drilled in 1887–88 for oil and, proving to be a large gas well, was allowed to blow off in the air for a long time before the gas was utilized. Within the last few years a number of other wells have been put down in a cautious extension of the field, until it now appears to be fairly well developed. Some of the wells are still vigorous producers and will probably continue to furnish gas for many years.

Attention should be directed to the fact that in well No. 201 the Big lime (Greenbrier limestone member of Mauch Chunk formation) is noted as being 37 feet thick. With the possible exception of well No. 177, in the Woodville field, this is the most northern point at which the limestone has been positively identified. It increases in thickness southward, and in that direction is mentioned in nearly all detailed records of wells drilled to it. In well No. 201 gas occurs in the Fifty-foot and the Gordon Stray sands at depths of 5 and 19 feet, respectively, below the top of the sands. In well No. 202 the Fifty-foot sand has two pay streaks, 9 and 36 feet below the top, and the pay streak in the Gordon Stray is 18 feet in the sand. In No. 204 gas occurs in the Fifty-foot sand 19 feet below the top, and in the Gordon Stray only 8 feet in the sand. In well No. 205, on the N. Fife farm, the Big lime is 23 feet thick. This well was found to contain no oil or gas, but some salt water was found in the Fifty-foot sand, about

33 feet below the top. In this well an unusual thickness of sandstone occurs below the Nineveh Thirty-foot sand. The interval usually occupied by the Gordon Stray, the Gordon, the Fourth, and the Fifth sands seems to be occupied by thin layers of hard sandstone separated by a relatively small quantity of shale. In well No. 207, on the Espey heirs property, the Big lime is reported to be only 9 feet thick. Gas occurs in the Fifty-foot sand and what seems to be the Nineveh Thirty-foot sand in this well. In well No. 247, on the J. M. Boyce farm, the Gordon sand is recorded at a depth of 2,225 feet, or 2,145 feet below the Pittsburg coal. This well appears to be on or near the axis of the Nineveh syncline, which has a north-south trend in this vicinity.

*Records of wells.*—The following table gives the records of certain wells in the Clifton field:

*Partial records of deep wells in the Clifton gas field, Upper St. Clair Township, Allegheny County, Pa.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
201	J. V. Gillilan No. 1.	Manufacturers Light & Heat Co.	Feet. 1,140	Pittsburg coal...	Feet. 287	Feet. 6	Depth of well, 2,350 feet. Water at 1,275 feet.
				Salt sand.....	1,187	138	
				Big lime.....	1,388	37	
				Big Injun sand...	1,425	235	
				Thirty-foot sand...	2,025	42	
				Gantz sand.....	2,159	35	
				Fifty-foot sand...	2,195	65	Gas at 2,200 feet.
				Gordon Stray sand.	2,315	25	Gas at 2,334 feet.
	J. A. Fife No. 1.	.....do.....		Pittsburg coal...	270	6	Depth of well, 2,365 feet.
				Gas sand.....	963	17	
				Salt sand.....	1,165	185	Water at 1,250 and 1,320 feet.
				Big Injun sand...	1,420	250	
				Thirty-foot sand...	2,040	20	
				Gantz sand.....	2,171	34	
				Fifty-foot sand...	2,205	32	Gas at 2,220 feet.
				Thirty-foot sand...	2,255	15	
				Gordon Stray sand.	2,315	34	
202	Gillilan heirs No. 1.	.....do.....	1,035	Pittsburg coal...	162		Depth of well, 2,240 feet.
				Salt sand.....	1,070	130	
				Big Injun sand...	1,315	255	
				Gantz sand.....	2,047	33	
				Fifty-foot sand...	2,086	36	Gas at 2,095 and 2,122 feet.
				Thirty-foot sand...	2,160	20	
				Gordon Stray sand.	2,212		Gas at 2,230 feet.
203	Squire Trimble No. 1.	.....do.....	980	Pittsburg coal...	130		Total depth of well, 2,314 feet.
				Gantz sand.....	2,015		
				Fifty-foot sand...	2,062		
				Gordon Stray sand.	2,260		
204	J. Trimble No. 2.	.....do.....	993	Pittsburg coal...	144		Depth of well, 2,210 feet.
				Salt sand.....	1,050	80	
				Big Injun sand...	1,240	290	
				Gantz sand.....	2,015	23	
				Fifty-foot sand...	2,048	38	Gas at 2,067 feet.
				Gordon Stray sand.	2,182		Gas at 2,190 feet.

*Partial records of deep wells in the Clifton gas field, Upper St. Clair Township, Allegheny County, Pa.—Continued.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
205	N. Fife No. 1.....do.....		Feet. 1,036	Pittsburg coal...	Feet. 185	Feet. 7	Depth of well, 2,750 feet.
				Salt sand.....	1,150	30	
				Big lime.....	1,327	23	
				Big Injun sand..	1,350	255	
				Squaw sand.....	1,700	40	
				Thirty-foot sand	1,876	57	Water at 2,123 feet.
				Gantz sand.....	2,060	22	
				Fifty-foot sand..	2,069	77	
				Gordon sand (?)..	2,300	50	
				Fourth sand (?)..	2,394	21	
207	Espey heirs No. 1.....do.....		1,068	Fifth sand (?)..	2,435	50	Depth of well, 2,270 feet.
				Pittsburg coal...	200	7	
				Salt sand.....	1,170	55	Water at 1,215 feet.
				Big Injun sand..	1,340	245	
				Thirty-foot sand	1,890	60	Gas at 2,126 feet.
				Gantz sand.....	2,078	22	
				Fifty-foot sand..	2,100	78	Gas at 2,258 feet.
				Thirty-foot sand (?)..	2,236	34	
247	J. M. Boyce No. 1.....do.....		848	Pittsburg coal...	80	.....	Pebbly.
				Gantz sand.....	1,950	.....	
				Gordon sand.....	2,225	.....	

**BETHEL AND SNOWDEN TOWNSHIPS, ALLEGHENY COUNTY.**

All of Bethel and a considerable part of Snowden townships are embraced in the Carnegie quadrangle. In the former township no oil has yet been found in paying quantities, and, so far as the writer could learn by diligent inquiry in the field, only three deep wells have been drilled. Of these wells one on the L. Grazier farm, located about 1 mile northeast of Upper St. Clair, proved to be unproductive; the others, Nos. 208 and 209, in the vicinity of Library, are said to produce gas from the Fifth sand, but no data relative to them, other than those shown in the records, were obtained. Records of wells in Bethel and Snowden townships have as a rule proved very unsatisfactory for close stratigraphic and structural work. This is due to the fact that the intervals between the various beds apparently increase from northwest to southeast across these townships, and that the Gordon Stray and the Gordon sands are either entirely absent or very poorly represented in this area. Evidence of this tendency of the Gordon and Gordon Stray sands to pinch out is shown in the records of the wells of the Clifton gas field, already listed; this change is also evident in the fields of Peters Township, Washington County, farther south. Coexistent with the thinning out of the Gordon and Gordon Stray sands there appears a marked increase in distance between the Fifth sand and the Pittsburg coal which can not be explained satisfactorily by the change from a sandy to a shaly phase of sedimentation. Under ordinary conditions such a change should have a tendency to decrease rather than increase the interval between the beds above and below this horizon. After carefully examining all the available evidence relative to this point the writer considers it very probable that there

is a slight increase in the distance between the Fifth sand and the Gordon sand, but that the greatest increase of the interval between the Fifth sand and the Pittsburg coal occurs above the Gordon and Gordon Stray sands. Therefore in these two townships the distance between the top of the Fifth sand and the top of the Gordon sand is calculated to be about 140 feet, and to remain fairly constant throughout the entire area, while the distance from the Gordon sand to the Pittsburg coal is considered to vary as indicated by the numbers on Plate V. This increase of interval seems to be largely due to the unconformity at the base of the Pottsville. It is evident that if all the records published in the table below had been carefully kept, and the depth, thickness, and character of each bed penetrated by the drill had been accurately noted, the variation of intervals between beds could be easily determined, with the result that a much more accurate structural map of the sands could have been made.

The records of wells Nos. 208 and 209 show little of stratigraphic or structural value. In the former, judging alone from distance between beds, the sand called the Fourth, which is said to furnish gas, is very probably the Fifth sand. In well No. 209 this sand is only 10 feet thick, and produces gas from a pay streak at the bottom. The Fifth is also the producing sand in No. 210, where it is reported to be open and pebbly. In well No. 211, on the William Cochran farm, the Salt sand supplies a large flow of gas. The Gantz and the Fifty-foot sands are here represented by "slate and shells," and the Nineveh Thirty-foot, Gordon Stray, Gordon, and Fourth sands are not noted. The Fifth sand is 18 feet thick, and furnishes gas from a pay streak 8 feet below the top. Well No. 212 on the William McConkey farm obtained salt water in the top of the Gas sand, with no gas; also a little water in either the Squaw or the Murrys ville sand. The Gantz and the Fifty-foot sands are reported to be 100 feet thick, with gas 6 feet from the bottom. The Fourth and the Fifth sands are reported to be 30 and 14 feet thick, respectively, and both to be gas bearing. Well No. 213, on the Henry Miller farm, found salt water in the Salt and the Big Injun sands at 1,100 and 1,600 feet, respectively, and gas in what is supposed to be the Fifth sand at a depth of 2,560 feet. This well was finished in June, 1898. In well No. 214, on the McMasters farm, gas was found in what is designated by the driller as the Fifty-foot and the Fifth sands. This gas had a closed pressure of 80 pounds per square inch, which seems to be unusually low. In this well oil is reported from the Gordon sand at a depth of 2,300 feet and 2,215 feet below the Pittsburg coal. Since the normal distance between the Pittsburg coal and the Gordon sand throughout most of this quadrangle holds remarkably constant at about 2,100 feet, this correlation is open to question, though the distance is increased toward the east at a rate to make it about 2,160 feet in the vicinity

of this well. It therefore seems more likely that the oil-bearing bed is really the Fourth sand, and that the gas-producing sand 200 feet below it is either the Elizabeth or the Sixth sand of Washington County. This sand also furnishes the gas from well No. 216 on the J. C. Wall farm. It is here reported to be only 5 feet thick, with gas at the bottom.

*Records of wells.*—The following table gives records of wells in Bethel and Snowden townships:

*Partial records of deep wells in Bethel and Snowden townships, Allegheny County, Pa.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
208	Larimer No. 1..	Manufacturers Light & Heat Co.	Feet. 1,002	Pittsburg coal...	Feet. 150	Feet.	Depth of well, 2,468 feet.
				Gantz sand.....	2,106		Water.
				Fourth sand.....	2,434		Fifth (?) sand.
209	R. A. Long No. 1.	.....do.....	1,000	Pittsburg coal...	140		Depth of well, 2,470 feet.
				Fifth sand.....	2,440	10	
210	Blumenstein No. 1.	.....do.....	1,079	Pittsburg coal...	215		Depth of well, 2,623 feet.
				Gantz sand.....	2,114		Water at 1,930 feet, salt.
				Fifty-foot sand...	2,135	45	
				Stray sand.....	2,264		
				Fifth sand.....	2,498	20	
211	Wm. Cochran No. 1.	.....do.....	1,170	Pittsburg coal...	290		Depth of well, 2,620 feet.
				Salt sand.....	1,215	40	Heavy flow of gas.
				Big Injun sand...	1,470	255	
				Fifty-foot sand...	2,310	90	Slate and shells.
				Fifth sand.....	2,590	18	Gas at 2,598 feet.
212	W. McConkey No. 1.	.....do.....	1,095	Pittsburg coal...	214		Water on top; no gas.
				Salt sand.....	1,133	147	
				Injun sand.....	1,385	265	
				Fifty-foot sand...	2,140	100	Hundred-foot sand (?) ; gas at 2,234 feet.
				Fourth sand.....	2,440	30	Gas in Fourth.
				Fifth sand.....	2,489	14	Gas.
213	H. Miller.....	Jefferson Oil Co..	1,142	Pittsburg coal...	245		Depth of well, 2,825 feet.
				Big Injun sand...			Salt water about 1,600 feet.
				Fifth sand.....			Gas at 2,560 feet.
214	McMasters.....	.....do.....	1,007	Pittsburg coal...	85		Depth of well, 2,510 feet.
				Fifty-foot sand...	2,067		Gas.
				Gordon sand.....	2,300		Oil.
				Fifth sand (?)...	2,500		Gas. Sixth sand (?) .
216	J. C. Wall.....	Philadelphia Co..	1,167	Big Injun sand...	1,325	300	Depth of well, 2,702 feet.
				Gantz sand.....	2,041	20	
				Fifty-foot sand...	2,102	49	
				Fifth sand.....	2,461	30	
				Sixth sand.....	2,580	5	Gas at 2,585 feet.

#### UNION TOWNSHIP, WASHINGTON COUNTY.

A small portion of Union Township is included in the southeast corner of Carnegie quadrangle. In this township are several gas wells which are generally included in the Finleyville oil and gas field, most of which lies in the Amity quadrangle.

*Finleyville oil and gas field.*—Within the Carnegie quadrangle this field has produced no oil unless from a few wells now abandoned in

the village of Finleyville on the southern border. In well No. 217 the gas comes from the so-called Gas sand, which is in reality the Mahoning sandstone member or Dunkard sand of drillers farther south in Washington and Greene counties. This sand is here only 660 feet below the Pittsburg coal. The record of well No. 218 is very incomplete, and nothing of value regarding it is known other than that the Hundred-foot sand furnishes the gas. Well No. 219 is located on the Frye heirs property, less than half a mile off the quadrangle south of Finleyville. This well is said to have been a freak oil well in the Fifty-foot sand. From information gathered from citizens of Finleyville it appears that this well when drilled in began flowing a very heavy dark oil at the rate of more than 100 barrels per day. Other wells drilled in short distances on all sides of this well, with the single exception of one about 100 feet away, are said to have been unproductive. This oil pool evidently covers less than 2 acres. Both of the successful wells are still producing a few barrels of oil per week. In the village of Finleyville a number of wells have found gas in the Fifty-foot sand. Of these, the C. Tritchman No. 1 well (No. 220) found the Gantz and the Fifty-foot sands to have a thickness of 33 and 42 feet, respectively, with a 10-foot break between. The gas pay streak occurs in the Fifty-foot sand 29 feet from the top.

*Records of wells.*—The following table gives records of certain wells in Union Township:

*Partial records of deep wells in Union Township, Washington County, Pa.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
217	S. F. Boyer No. 1.	Lisle & McClay..	Feet. 1,143	Pittsburg coal...	Feet. 90	Feet. .....	Depth of well, 805 feet. Gas at 780-803 feet.
218	H. Smith No. 1.	Monongahela Gas Co.	971	Gas sand (Dunkard).	750	.....	
219	Frye heirs No. 1.	.....	966	Gantz sand.....	1,900	.....	Depth of well, 2,004 feet.
220	C. Tritchman No. 1.	Chartiers Oil Co..	950	Fifty-foot sand..	1,950	.....	
				.....do.....	1,920	90	
				Fifty-foot sand..	1,880	33	No oil or gas.
					1,923	42	Gas at 1,952 feet.

#### PETERS AND NORTH STRABANE TOWNSHIPS, WASHINGTON COUNTY.

These townships embrace that part of the quadrangle which lies in Washington County west of Union Township and southeast of Chartiers Creek. The Nineveh syncline crosses the western part of Peters Township in a north-south direction. The Waynesburg anticline crosses the southeastern portion of the quadrangle through Peters, Union, and Snowden, with a northeast-southwest trend. Along the axis and flanks of the latter fold a number of gas wells have been found in the southeastern part of Peters Township. In a well (No.

221) on the David Reese property gas was found in the Dunkard sand, mentioned above as being equivalent to the so-called Gas sand of well No. 217. Gas also occurs in the Salt, the Big Injun, and the Gantz sands, with a small quantity of oil in what is described as "slate and shells" at a horizon somewhat below that of the Fifth sand. Well No. 223 on the David Higbie farm found gas in the Fifty-foot sand, having a minute pressure of 38 pounds. Well No. 224 on the Townsend farm got gas from a 2-foot pay in the Fifth sand at a depth of 2,550 feet.

In this portion of Peters Township many wells showed more or less salt water in some portion of the Gantz sand or of the Fifty-foot sand. The volume of gas in all of them was relatively small.

*McMurry oil and gas field.*—The McMurry field includes an oil and gas producing belt from near the Allegheny County line southwest across the center of Peters Township to Little Chartiers Creek. Oil in this field comes almost entirely from the Fifty-foot sand, which also furnishes more or less salt water with the oil. The most persistent gas pool is in the Fifth sand, but pools of less size are also found in the Gordon, the Gordon Stray, and the Nineveh Thirty-foot sands. This field was first developed as an oil pool in the Fifty-foot sand, but, although some of the wells started off with a fair production, many of them declined rapidly, and were down to a few barrels per day within two to four years. These were then drilled deeper and developed considerable gas in the Fifth sand.

The sands of this field appear to contain considerably more than an average amount of salt water. A number of operators report that in many places the Salt and the Big Injun sands when first tapped by the drill flowed salt water in large quantities, the water from the latter sand being accompanied by considerable gas. The Gantz sand is said to contain some salt water, but most of the water of the Hundred-foot comes from the lower member or the Fifty-foot sand. This water is said to have a head of 300 to 400 feet. Salt water seems to occur less often, in smaller quantities and with a lower head, in the Gordon and the Fifth sands. Data relative to the water conditions in these sands are scant, and their reliability is not above question, but it appears to be generally recognized as a fact that both these sands do carry more or less salt water, and that in many wells which produce gas from the Fifth sand a small amount of salt water eventually makes its appearance. There seems to be no way of determining definitely whether this water is indigenous to the Fifth sand or comes from some higher bed.

In well No. 227 on the Lushen farm the Fifty-foot sand has an oil pay streak extending from 2 to 12 feet below the top of the sand. The Fifth sand furnishes gas in this well. In well No. 228 on the Albert E. Fife farm a show of oil was found in the Fifty-foot sand at

a depth of 2,208 feet, with a show of gas in the Gordon sand at 2,445 feet. The Sixth sand was also noted in this well, the top of which is at a depth of 2,676 feet, or 136 feet below the top of the Fifth. The normal distance between the tops of the Gordon and the Fifth sands throughout a considerable part of this quadrangle farther to the southeast is from about 120 to 140 feet; in well No. 228 this distance is reduced to 95 feet, and on the south, in well No. 229, on the H. B. McMurry farm, this distance is exactly 100 feet. In the last-mentioned well the Gordon Stray is separated from the Gordon by 55 feet of shale, which is the greatest distance between these beds known in the quadrangle. The Big lime is here (No. 229) 40 feet thick, and directly overlies the Big Injun sand. Oil and water occur in the 6 feet of the Fifty-foot sand. In well No. 230, on the Mitchell Douglas farm, gas and salt water occur in the Salt sand, and gas also in the Fifth and in what is called the Thirty-foot sand, which is here separated from the top of the Gordon below by 65 feet of shale. This sand seems to be the same as that designated in well No. 229 as the Gordon Stray. Sufficient data are not available to make a definite correlation of these beds. The Gordon Stray and the Gordon sands in well No. 231 seem to be united into a sandstone 100 feet thick which carries gas 70 feet below the top. In well No. 233 the Fifty-foot sand is reported to be dry, with gas in the Fifth sand 5 feet below the top. The Big Injun sand showed a little oil in well No. 234, with some gas in the Fifty-foot, and some oil in the Gordon at a depth of 2,415 feet, the top of the pay streak being 20 feet in the sand.

South of this well no wells are known to have been drilled nearer than those of the field in the vicinity of well No. 236, which was a gas well in the Salt sand and an oil and water well in the Fifty-foot sand. These are the productive sands in wells Nos. 237, 238, 239, 240, 241, and 242; the last-named well also furnishes gas from the Gantz sand. It will be observed that a sand called Maxon sand has been noted in a number of wells in this field. This sand overlies the Big lime in some wells, but in well No. 244 the sand is overlain by 12 feet of limestone, which is locally known as Little lime. In well No. 243 the sand known as the Maxon sand is water bearing. The Gordon and the Fifth sands also produce gas in well No. 244, and the Fifty-foot sand some oil. West of well No. 244 the sands appear to dip sharply toward the trough of the Nineveh syncline, and the productive area abruptly ceases.

Only a few measurements of closed pressures of gas wells in this field were obtained. These vary from about 125 pounds in the Salt sand to approximately 900 pounds in the Fifth. No facts are at hand to show whether the closed pressure of gas in the different sands increases uniformly with an increase in depth or not. In the fields



of the quadrangle this is generally true, though each sand shows great local variations in closed pressures from pool to pool.

West of the McMurry field few deep wells have been drilled in the townships outside of the Canonsburg field, which has been already described under Chartiers and Cecil townships. One or two of these scattered holes have found small flows of gas in one or more sands, but no oil in paying quantities. In one of these wells (No. 245) on the John McDowell farm, gas was found in the Gantz, the Fifty-foot, and the Gordon Stray sands, with also a show of oil in the Fifty-foot. This well is located near the axis of the Nineveh syncline, but no mention is made of water in any of the sands, and the fact that the record of this well shows that 6½-inch casing was put only through the Salt sand and the further fact that the lower sands carry gas indicate that it is remarkably free from salt water. It is to be regretted that the closed pressure of the gas in each of the producing sands in this well was not recorded. The maximum pressure is said to be about 400 pounds per square inch. The records of wells Nos. 246 and 248 are so incomplete as to be of little value.

*Records of wells.*—The following table shows records of wells in Peters and North Strabane townships:

*Partial records of deep wells in Peters and North Strabane townships, Washington County, Pa.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
221	D. Reese No. 1	Cambria Oil Co..	Feet. 1,027	(Coal, gas, water)	Feet. 597	Feet. 5	Depth of well, 2,943 feet.
				Dunkard sands..	650	100	Gas.
				Salt sand.....	990	120	Little water and gas at 1,090 feet.
				Big lime.....	1,130	.....	Gas at 1,230 and 1,24 feet.
				Big Injun sand..	1,165	242	(Gantz sand?) Gas at 1,947 feet; no water.
				Squaw sand.....	1,450	75	
				Hundred-foot sand.	1,928	62	
				Thirty-foot sand	2,050	20	
				Gordon Stray sand.	2,130	12	
				Gordon sand.....	2,170	87	
				Fifth sand (?)...	2,350	55	"Slate and shells."
				Bayard sand (?)..	2,405	.....	Trace of oil.
223	D. Higbie.....	Jefferson Gas Co..	1,157	Pittsburg coal...	275	.....	Depth of well, 2,645 feet.
				Fifty-foot sand..	.....	.....	Gas at 2,220 feet.
				Fifth sand.....	.....	.....	Gas at 2,535 feet.
224	Dr. Townsend No. 1.	Manufacturers Light & Heat Co.	1,129	Pittsburg coal...	276	.....	Depth of well, 2,564 feet.
				Fifth sand.....	2,547	.....	Gas at 2,550-2,552 feet.
225	W. W. Smith No. 2.	.....do.....	1,044	Pittsburg coal...	230	.....	Depth of well, 2,559 feet.
				Gantz sand.....	2,152	.....	feet.
				Fifty-foot sand..	2,180	.....	Salt water at 20-25 feet.
				Gordon Stray sand.	2,430	.....	
				Fourth sand.....	2,490	.....	Sand and shells.
				Fifth sand.....	2,515	.....	

*Partial records of deep wells in Peters and North Strabane townships, Washington County, Pa.—Continued.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
			<i>Feet.</i>		<i>Feet.</i>	<i>Feet.</i>	
226	J. Patterson No. 1.	Manufacturers Light & Heat Co.	1,040 ±10	Pittsburg coal... Salt sand..... Big Injun sand.. Berea sand..... Fifty-foot sand..  Gordon sand.... Fourth sand.... Fifth sand.....	265 1,185 1,425 2,010 2,200  2,387 2,452 2,526	..... 70 250 30 7  18 12 36	Depth of well, 2,597 feet.  Oil and water at 2,207 feet; second pay at 2,209 feet; gas at 2,345 feet. Gas at 2,542 and 2,548 feet.
227	Lushen No. 1.	.....do.....	.....	Pittsburg coal... Gantz sand..... Fifty-foot sand.. Fifth sand.....	235 2,145 2,173 2,496	..... ..... 24 .....	Depth of well, 2,521 feet. Oil at 2,175-2,185 feet. Gas at 2,500 feet.
228	A. E. Fife No. 1	.....do.....	1,066	Pittsburg coal... Gantz sand..... Fifty-foot sand.. Gordon sand.... Fifth sand..... Sixth sand.....	271 2,160 2,208 2,445 2,540 2,676	..... ..... ..... ..... ..... .....	Depth of well, 2,922 feet. Little oil. Show of gas.
229	H. B. McMurry No. 1.	Lyle & McCloy...	991	Pittsburg coal...  Salt sand..... Big lime..... Big Injun sand.. Thirty-foot sand Gantz sand..... Fifty-foot sand.. Gordon Stray sand. Gordon sand.... Fourth sand.... Fifth sand.....	188  1,110 1,310 1,350 1,900 2,080 2,128 2,260 2,345 2,395 2,445	.....  80 40 250 75 40 6 30 30 25 35	Depth of well, 2,506 feet. Water.  Shells. Oil and water.  Some gas.
230	M. Douglas No. 1.	Manufacturers Light & Heat Co.	1,060	Pittsburg coal...  Salt sand..... Big Injun sand.. Gantz sand..... Fifty-foot sand.. Thirty-foot sand Gordon sand.... Fourth sand.... Fifth sand.....	242  1,061 1,375 2,131 2,155 2,284 2,391 2,480 2,523	.....  225 300 12 45 42 54 20 36	Depth of well, 2,560 feet. Gas and water at 1,066 feet.  Gas at 2,303 feet. Gas at 2,528 feet.
231	McCormick heirs No. 1.	.....do.....	1,061	Pittsburg coal... Salt sand..... Big Injun sand.. Gantz sand..... Fifty-foot sand.. Thirty-foot sand Gordon (and Stray?) sands. Fifth sand.....	255 1,180 1,420 2,130 2,210 2,280 2,360 2,530	6 112 225 ..... ..... 35 100 .....	Depth of well, 2,904 feet.  Gas at 2,430 feet.
232	C. R. McMurry No. 1.	Lyle & McCloy...	1,000	Pittsburg coal...  Salt sand..... Big lime..... Big Injun sand.. Thirty-foot sand Gantz sand..... Fifty-foot sand.. Gordon Stray sand. Gordon sand.... Fifth sand.....	208  1,160 1,355 1,385 1,930 2,110 2,145 2,280 2,360 2,465	.....  65 30 235 100 35 13 20 30 35	Depth of well, 2,566 feet. Water.  Shells. Oil and water at 2,150 feet.
233	Williams No. 1.	.....do.....	1,0507	Pittsburg coal...  Salt sand..... Big Injun sand.. Thirty-foot sand Gantz sand..... Fifty-foot sand.. Gordon Stray sand. Gordon sand.... Fifth sand.....	310  1,295 1,470 2,000 2,195 2,240 2,380 2,450 2,567	.....  25 240 140 45 5 20 40 30	Depth of well, 4,475; feet; cable. Water. Shells. Dry. Gas at 2,572 feet.

*Partial records of deep wells in Peters and North Strabane townships, Washington County, Pa.—Continued.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
			Feet.		Feet.	Feet.	
234	Parks No. 1.....		1,050	Pittsburg coal...	265	.....	Depth of well, 2,550 feet.
				Gas sand.....	1,100	60	Salt water at 1,080 feet.
				Salt sand.....	1,220	75	Water at 1,250 feet.
				Big Injun sand...	1,410	250	A little oil.
				Gantz sand.....	2,137	21	
				Fifty-foot sand...	2,170	60	A little gas at 2,195 feet.
				Gordon Stray sand.	2,365	20	Break, slate, at 2,385-2,395 feet.
				Gordon sand.....	2,395	30	Oil at 2,415 feet.
				Fourth sand.....	2,450	25	
				Fifth sand.....	2,510	25	
235	J. Johnson.....		1,103	Coal (cable).....	365	.....	Depth of well, 2,568 feet.
				Fifth sand.....	2,515	.....	Gas at 2,520 feet.
236	J. H. McMurry	Lyle & McCloy...	1,107	Pittsburg coal...	310	.....	Depth of well, 2,250 feet.
				Gas sand.....	1,200	60	
				Salt sand.....	1,275	35	Gas at 1,280 feet.
				Big Injun sand...	1,455	255	
				Thirty-foot sand	2,015	95	Shells.
				Gantz sand.....	2,185	37	
				Fifty-foot sand...	2,227	32	Oil and water at 2,235 feet.
237	J. R. McMurry No. 1.	.....do.....	1,182	Pittsburg coal...	395	.....	Depth of well, 2,342 feet.
				Big Injun sand...	1,550	235	
				Thirty-foot sand	2,085	100	Shells.
				Gantz sand.....	2,270	30	
				Fifty-foot sand...	2,310	25	Oil and water at 2,330 feet.
238	.....do.....	.....do.....	1,099	Pittsburg coal...	236	.....	Total depth, 2,213 feet.
				Salt sand.....	1,170	75	Water.
				Big lime.....	1,360	30	
				Big Injun sand...	1,390	250	
				Thirty-foot sand	1,970	50	Shells.
				Fifty-foot sand...	2,145	68	Oil and water at 2,159 feet.
239	.....do.....	.....do.....	1,046	Pittsburg coal...	.....	.....	Depth of well, 2,195 feet.
				Gas sand.....	1,145	55	
				Salt sand.....	1,240	20	Gas at 1,245 feet.
				Big Injun sand...	1,445	205	
				Thirty-foot sand	1,910	140	Shells.
				Gantz sand.....	2,120	30	
				Fifty-foot sand...	2,160	33	Oil and water at 2,167 feet.
240	J. H. McMurry No. 3.	.....do.....	1,152	Pittsburg coal...	336	.....	Depth of well, 2,302 feet.
				Gas sand.....	50	.....	Gas at 2,160 feet.
				Salt sand.....	1,330	20	
				Big Injun sand...	1,510	240	
				Thirty-foot sand	2,050	100	Shells.
				Gantz sand.....	2,242	40	Gas at 2,255 feet.
				Fifty-foot sand...	2,282	20	Oil and water at 2,286-2,293 feet.
241	.....do.....	.....do.....	1,085	Pittsburg coal...	296	.....	Depth of well, 2,233 feet.
				Salt sand.....	1,210	80	Gas at 1,270 feet.
				Maxon sand.....	1,420	20	
				Big lime.....	1,440	20	
				Big Injun sand...	1,460	240	
				Thirty-foot sand	1,950	100	
				Gantz sand.....	2,170	40	
				Fifty-foot sand...	2,210	28	Oil and water at 2,217-2,224 feet.
242	Speer heirs No. 2	.....do.....	1,109	Pittsburg coal...	330	.....	Depth of well, 2,275 feet.
				Gas sand.....	1,200	65	
				Salt sand.....	1,270	65	Gas at 1,280 feet.
				Maxon sand.....	1,460	20	
				Big lime.....	1,480	20	
				Big Injun sand...	1,500	225	
				Thirty-foot sand	2,025	125	
				Gantz sand.....	2,197	46	
				Fifty-foot sand...	2,246	29	Oil and water at 2,254 feet.

*Partial records of deep wells in Peters and North Strabane townships, Washington County, Pa.—Continued.*

Map No.	Name.	Owner.	Altitude.	Name of stratum.	Depth to top.	Thickness.	Remarks.
243	Spear heirs No. 1.	.....do.....	Feet. 1,080	Pittsburg coal... Salt sand..... Maxon sand..... Big lime..... Thirty-foot sand... Gantz sand..... Fifty-foot sand..	Feet. 251 1,150 1,370 1,400 1,945 2,136 2,175	Feet. ..... 50 30 30 100 29 33	Depth of well, 2,198 feet. Water. Shells. Oil and water at 2,176-2,185 feet.
244	J. L. McNairy No. 2.	Manufacturers Light & Heat Co.	1,050	Pittsburg coal... Gas sand..... Salt sand..... Mountain lime... Maxon sand..... Big lime..... Big Injun sand... Thirty-foot sand... Gantz sand..... Fifty-foot sand.. Lower Thirty-foot sand. Stray sand..... Gordon sand..... Fourth sand..... Fifth sand.....	245 1,140 1,220 1,355 1,367 1,372 1,417 1,990 2,123 2,153 2,340 2,375 2,395 2,450 2,492	6 45 30 12 5 38 233 60 30 20 20 16 25 13 35	Depth of well, 2,860 feet. Water at 1,240 feet. Show of gas at 1,521 feet. Show of oil at 2,168 feet; best sand at 2,175-2,183 feet. Gas at 2,397 feet. Gas at 2,505 feet.
245	J. McDowell No. 1.	Lyle & McCloy...	910	Pittsburg coal... Salt sand..... Big lime..... Big Injun sand... Thirty-foot sand... Gantz sand..... Fifty-foot sand..  Gordon Stray... Gordon sand..... Fourth sand..... Fifth sand.....	215 1,180 1,370 1,390 1,930 2,100 2,143  2,250 2,350 2,410 2,468	..... 45 20 240 90 33 38  20 30 20 12	Depth of well, 2,614 feet. Shells. Gas at 2,120 feet. Gas and show of oil at 2,150 feet. Gas at 2,250 feet.
246	J. McClelland No. 1.	W. F. Borchers..	980 ±10	Pittsburg coal...	238	.....	Depth of well, 2,618 feet.
248	T. O'Neil.....	.....	1,190 ±	Fifty-foot sand..	2,331	.....	Depth of well, 2,332 feet.

#### GENERAL STRUCTURAL POSITION OF OIL AND GAS POOLS IN EACH PRODUCING SAND.

If the positions taken by accumulations of oil and gas are to any extent due to the folds in the oil sands, the pools in each sand, over greater or less areas, should show similar structural relations, the amount of the accumulated oil being coordinated with the structure. Conversely, the lack of similarity in the structural arrangement of pools should indicate that other geologic factors were involved in the process of accumulation.

The structural position of the oil and gas pools in each sand are shown on the accompanying maps, and only the analogy in position of some of the pools need be pointed out.

*Fifth sand.*—The largest accumulation in this sand, the McDonald pool, occupies a broad structural terrace extending northeast-southwest, from which the rocks dip relatively steeply southeast to

the axis of the Nineveh syncline. This terrace is broken by many small secondary folds of local extent only, and it is limited on the northwest by a somewhat more rapid and uniform rise of the rocks in that direction. The dip along the major axis of this pool is about 140 feet in 11 miles, or approximately 14 feet per mile. From northwest to southeast across the pool the dip varies at different points from about 20 to 65 feet per mile.

Northward the oil pools in this sand in the Moon Run field occupy successively higher positions along the same structural terrace, which gradually assumes the form of a low arch pitching south.

Still farther north along this anticline the oil in this sand gives way to accumulations of gas in the vicinity of the Ohio River. In the western part of the Moon Run field, south of Beacon, the gas pool in the Fifth sand is structurally slightly higher than the oil in the McCurdy pool, to which it seems closely connected, but lower than the oil pool lying east on the crest of the anticline.

The Fifth sand pool of the Canonsburg field occupies a small sloping terrace very similar to that occupied by the southern part of the McDonald pool, but about 100 feet lower down the slope and on the southern side of the Cross Creek syncline. Southwest of this pool, up the slope and on the crest of the Westland dome, occur the corresponding gas pools.

Northeast of the Canonsburg pool, along the strike of the oil sand, on the north side of the Cross Creek syncline, occur the small gas pools of this sand in the Licksillet, Hopper, Cuddy, and Bridgeville fields, which appear not to be intimately associated with accumulations of oil in this sand. In the McMurry field the gas accumulations that have been so far discovered lie in a belt parallel to the strike of the rocks, the lower edge being at a slightly lower level structurally than the last-named pools and about 75 feet below the Canonsburg oil pool. This fact shows greater structural significance when it is remembered that the Fifth sand rises southeastward from this belt to the crest of the Amity anticline, and that, so far as known, this sand is continuous over the area. The general structural features of the Fifth sand pools in this quadrangle are that the areas of accumulation are highest at the northwest and become successively lower toward the southeast, regardless of the size and height of the anticlines in the bed, and that each separate accumulation tends more or less toward an arrangement by which its major axis lies parallel to the strike of the rocks.

*Fourth sand.*—The structural map of the oil and gas pools shows that the Fourth sand gas pool in the Aten field, near the northwest corner of the quadrangle, lies squarely across the contour lines and therefore directly up the slope of the sand, covering a vertical range of about 90 feet between the 1,040-foot and the 1,130-foot contours.

East of this pool on the flat, southward-pitching crest of the Wildwood anticline a number of small gas pools have been noted between the 1,000-foot and the 1,100-foot contours. The Fourth sand oil pool in the central part of the Moon Run field occupies the crest of a secondary anticline between the 1,080-foot and the 1,100-foot contours. On the next anticline northeast a small gas pool has been developed by two wells on the property of the Pressed Steel Car Co., at McKees Rocks, which is on the 1,030-foot contour.

South of this productive belt the Fourth sand is barren of oil or gas, except one or two very small accumulations along the Fifth sand terrace in the McDonald field, the next important accumulation being the great Venice-Hopper oil pool. This accumulation lies roughly between the 800-foot and the 900-foot contours, and its major axis extends along the strike of the rocks at an average elevation of 850 feet. This area forms a productive belt between the 800-foot and the 900-foot contours along the relatively steep western limb of the Nineveh syncline. It will be seen that the few small oil and gas pools in this sand in the Canonsburg district occur along this belt. Two gas wells in the Fourth sand about 1 mile east of Cecil, and another in the Bridgeville field, 3 miles away, are practically on the 760-foot contour, and, so far as they go, show a tendency toward another productive belt at a lower level in the sand than the Venice-Hopper field, though the two great belts mentioned above cover practically all of the known oil and gas pools in this quadrangle. Here, again, is seen the tendency of pools to accumulate in successively lower belts from northeast to southwest.

*Gordon sand.*—The oil and gas pools in the Gordon sand do not show as clearly defined belts of accumulation as those in the sands already described. The Moon pool, at the northwest corner of the Carnegie quadrangle, lies between the 1,060-foot and the 1,110-foot contours; the Aten gas field is between the 1,070-foot and the 1,080-foot contours; and the Coraopolis oil pool, farther northeast, just off the northern border, lies mostly between the 1,060-foot and the 1,110-foot contours, the most northern extension reaching up to the 1,120-foot level.

In the Ewing Mills pool the gas is at an elevation of 1,040 to 1,050 feet, while the gas pools in the vicinity of Neville Island range from the 1,100-foot to the 1,150-foot contours. This producing belt continues to rise higher in the sand farther northeast beyond the limits of the Carnegie quadrangle. South of Beech Cliff mines, in North Fayette Township, are three small gas wells in the Gordon sand, which are between the 1,000-foot and the 1,030-foot contours. This is also the height of a small pool in the western part of the McCurdy field. Continuing eastward the 1,000-foot contour is found to mark somewhat closely the southern border of the Gordon

oil pool in the Moon Run field, though this pool extends upward along the pitching crest of the anticline for about 70 feet and in the Chartiers oil field ranges from the 990-foot to the 1,060-foot contours.

The great Gordon sand pool in the McDonald field has the same general outline as the Fifth sand pool in that field, which has been described. The upper edge of this pool is probably at about the 990-foot contour at the northern end, from which it drops about 100 feet southeast in the Carnegie quadrangle. At the northern end the lower line of the oil-producing area in this sand is at an altitude of about 940 feet, from which point it crosses the contours diagonally down slope to the southern edge, the 820-foot contour being about the lowest reached. Down the dip of the sand from this pool occurs the gas pool in the Hopper field between the 840-foot and the 860-foot contours.

In the Canonsburg district the principal oil pools are between 800 and 840 feet in elevation, with the eastern extension of the great Hickory gas field at about 890 to 970 feet. Several very small pools of oil have been found in this field at various levels along the western limb of the Nineveh syncline, where the Gordon sand has the greatest dip within the quadrangle.

East of the Nineveh syncline a small pool of gas occurs in the Bridgeville field at an elevation of about 770 feet, which is at the same level as the upper edge of the gas pool in the Clifton field, 3 miles farther southeast. In the McMurry field three of the six small pools discovered lie on the 650-foot contour—one on the 670-foot contour, the remaining two at elevations of 620 and 510 feet, respectively.

*Nineveh Thirty-foot sand.*—The pool in the Bellevue field at the northern edge of the quadrangle is structurally the highest in the Nineveh Thirty-foot sand in the Carnegie quadrangle. It occupies the southward-pitching trough of the Nineveh syncline between the 1,090-foot and the 1,120-foot contours. South of this pool in the same trough gas occurs in a well of the Pittsburgh Forge & Iron Co. in Allegheny on the 1,060-foot contour. The oil and gas pools in the Ewing Mills field occur about 20 feet farther down the dip. The Imperial pool, which is the largest in this sand in the Carnegie quadrangle, lies along a belt of comparatively steep dip, just north of the Mount Nebo syncline, with the major axis of the pool parallel to the structural contours. The upper edge of this pool is on or near the 1,020-foot contour, the lower side being at an elevation of about 970 feet. On the opposite side of the Wildwood anticline from the Imperial pool, oil and gas pools in the Nineveh Thirty-foot sand occur south of Beacon on the 1,020-foot contour. Oil has also been found in the McCurdy field in this sand in a small syncline in the eastern side of the Wildwood anticline at an elevation of 960 to 980 feet. The Nineveh Thirty-foot sand pool in the Woodville field lies squarely in the bottom

of a small basin in the trough of the Nineveh syncline at an elevation of 680 to 700 feet. The gas pool in this sand at Bridgeville can not be clearly outlined, but it appears to occupy the pitching end of a secondary anticline at an elevation of about 740 to 780 feet. With this possible exception, the Nineveh Thirty-foot pools show invariably a tendency toward accumulation in synclines, and, so far as may be observed from scattered pools, a fairly close structural arrangement for each belt of pools.

*Hundred-foot sand.*—The Aten and the Imperial pools in the Hundred-foot sand appear to belong to separate productive belts, the former being between the 1,040-foot and 1,080-foot contours and the latter at an elevation of 990 to 1,000 feet, with a dry area between them. Traced eastward these two productive belts appear to merge in the western part of the Moon Run field, where the larger pools lie between the 1,020-foot and 1,100-foot contours, along the pitching axis of a small anticline. Similar anticlines farther east also carry pools at successively high points in the sand.

Another belt of productive territory in the Hundred-foot sand is marked by a number of small gas and oil pools in the Venice and Canonsburg fields between the 800-foot and the 840-foot contours. This may be traced northeast through the Mawhinney, Cecil, Hopper, Cuddy, and Lickskillet oil fields, which collectively occupy a belt between the 690-foot and the 840-foot contours. This belt may be continued across the Nineveh syncline in the vicinity of Woodville and thence southeast through the Clifton gas pool, which lies between the 720-foot and the 780-foot contours. Farther southeast from this pool two small gas areas occur near the eastern border of the quadrangle, one on the 720-foot contour and the other on the 760-foot contour. From this point southwest along the strike of the rocks the producing belt in the Hundred-foot sand in the McMurry field occurs between the 650-foot and the 670-foot contours. This is one of the most striking structural alignments shown by pools in the quadrangle, and is indicative of what has been found to occur in this sand in the Sewickley quadrangle, which joins the Carnegie to the north. On the Amity anticline, at the southern border of the quadrangle, a single well obtained a small amount of gas from the Hundred-foot sand between the 850-foot and 860-foot contours, and in the Finleyville field both gas and oil occur at elevations ranging from about 800 to 830 feet. This productive belt has not been traced farther northeast, but it presumably coincides with the Castle Shannon gas pool, which lies between the 830-foot and the 860-foot contours.

In conclusion, this brief discussion of the structural position of the pools indicates: (1) That the individual study of pools by sands is of far greater value than the general grouping of fields along folds without regard to the producing sands; (2) that areas found to produce



from two or more sands are in many cases especially favored structurally, but that the fact that productive belts in one sand in most cases do not conform to productive belts in another sand shows that other factors, probably even more important than structure, affect the position of oil and gas pools; (3) that the structural analogy of pools in a given sand relates not so much to definite structural features, as anticlines or synclines, as it does to the height of the pools above some horizontal plane; (4) that each of the oil or gas bearing sands has a series of productive belts at structurally different heights, and that these belts occupy successively lower elevations from northwest to southeast across the Carnegie quadrangle regardless of the heights or depths of the various folds with which they are associated; (5) that there is a general inclination of each productive belt to ascend the structure toward the northeast and to descend it toward the southwest; and (6) that future drilling to be most effective in opening new pools in this quadrangle should be conducted along the structural lines of productive belts and not in the barren or less productive areas between.

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DEPARTMENT OF THE INTERIOR  
UNITED STATES GEOLOGICAL SURVEY

GEORGE OTIS SMITH, DIRECTOR

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BULLETIN 457

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RESULTS OF SPIRIT LEVELING  
IN THE  
STATE OF WASHINGTON

1896 TO 1910, INCLUSIVE

---

R. B. MARSHALL, CHIEF GEOGRAPHER

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WORK DONE IN COOPERATION WITH THE STATE  
DURING 1909 AND 1910



WASHINGTON:  
GOVERNMENT PRINTING OFFICE  
1911



SECRET

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# RESULTS OF SPIRIT LEVELING IN THE STATE OF WASHINGTON, 1896 TO 1910, INCLUSIVE.

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R. B. MARSHALL, *Chief Geographer.*

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## INTRODUCTION.

*Scope of the work.*—All results of spirit leveling in Washington previously published by the United States Geological Survey and all results of later work in the State are included in this report, rearranged by quadrangles. All elevations are based on the precise-level line of the United States Coast and Geodetic Survey from Seattle to Wallula, as adjusted by that bureau in 1905.

*Personnel.*—The field work previous to 1903 was done under the general direction of R. U. Goode, geographer; that for 1903 to 1906, inclusive, under E. M. Douglas, geographer; that for 1907 under R. B. Marshall, geographer; and the later work under T. G. Gerdine, geographer, under the general direction of R. B. Marshall, chief geographer. Credit is given to the different levelmen in the introduction to each list. The office work of computation, adjustment, and preparation of lists was done mainly by S. S. Gannett, geographer, and D. H. Baldwin, topographer, and since 1907 under the general direction of E. M. Douglas, geographer.

*Classification.*—The elevations are classified as precise or primary, according to the methods employed in their determination. For precise lines instruments and rods of the highest grade are used, each line is run in both forward and backward directions, and every precaution is taken to guard against error. The allowable divergence between the forward and the backward lines in feet is represented by the formula  $0.017\sqrt{D}$ , in which  $D$  is the distance in miles between bench marks. For primary lines standard  $Y$  levels are used; lines are run in circuits or are closed on precise lines, with an allowable closing error in feet represented by the formula  $0.05\sqrt{D}$ , in which  $D$  is the length of the circuit in miles, sufficient care being given the work to maintain this standard. For levels of both classes careful office adjustments are made, the small outstanding errors being distributed over the lines.

*Bench marks.*—The standard bench marks are of two forms. The first form is a circular bronze or aluminum tablet ( $C$  and  $E$ , Pl. I),

3½ inches in diameter and one-fourth inch thick, having a 3-inch stem, which is cemented in a drill hole in solid rock, in the wall of some public building, in a bridge abutment, or in other substantial masonry structure. The second form (*F*, Pl. I), employed where masonry or rock is not accessible, consists of a hollow wrought-iron post 3½ inches in outer diameter and 4 feet in length after being split at the bottom and expanded to 10 inches in order to give a firm bearing on the earth. A bronze or aluminum-bronze cap is riveted over the top of the post, which is set about 3 feet in the ground. A third style of bench mark with abbreviated lettering (*B* and *D*, Pl. I) is used for unimportant points. This consists of a special copper nail 1½ inches in length driven through a copper washer seven-eighths of an inch in diameter.

The tablets, as well as the caps on the iron posts, are appropriately lettered, and for cooperating States the fact of such cooperation is indicated by the addition of the State name (*G*, Pl. I). The numbers stamped on the bench marks described in the following pages represent the elevations to the nearest foot as determined by the levelman. These numbers are stamped with  $\frac{1}{16}$  inch steel dies on the tablets or post caps, to the left of the word "feet." The office adjustment of the notes and the reduction to mean sea level datum may so change some of the figures that the original markings are 1 or 2 feet in error. It is assumed that engineers and others who have occasion to use the bench-mark elevations will apply to the Director of the United States Geological Survey, at Washington, D. C., for the adjusted values, and will use the markings as identification numbers only.

*Datum.*—All United States Geological Survey elevations are referred to mean sea level, which is the level that the sea would assume if the influence of winds and tides were eliminated. This level is not the elevation determined from the mean of the highest and the lowest tides, nor is it the half sum of the mean of all the high tides and of the mean of all the low tides, which is called half-tide level. *Mean sea level is the average height of the water, all stages of the tide being considered.* It is determined from observations made by means of tidal gages placed at stations where local conditions, such as long narrow bays, rivers, and like features, will not affect the height of the water. To obtain even approximately correct results these observations must extend over at least one lunar month, and if great accuracy is desired they must extend over several years. At ocean stations half-tide level and mean sea level usually differ but little. It is assumed that there is no difference between the mean sea level as determined from observations in the Atlantic Ocean, the Gulf of Mexico, or the Pacific Ocean.

The connection with tidal stations for bench marks in certain areas that lie at some distance from the sea coast is still uncertain, and this fact is indicated by the addition of a letter or a word to the right of the word "Datum" on tablets or posts. For such areas corrections



GEOLOGICAL SURVEY BENCH MARKS.

*A.* Tablet used in cooperating States. The State name is inserted at *G*.  
*B* and *D.* Copper temporary bench mark, consisting of a nail and copper washer.  
*A.*, *C.*, and *E.* Tablets for stone or concrete structures.  
*F.* Iron post used where there is no rock.



of published results will be made from time to time as the precise-level lines of the United States Geological Survey or other Government organizations are extended.

Maps of the following quadrangles, wholly or partly in Washington, have been published by the United States Geological Survey up to February 15, 1911. They may be obtained for 5 cents each, or (except as noted) \$3 a hundred, on application to the Director of the Survey at Washington, D. C.

Blaine.	Quincy.
Blalock Island.	Red Rock.
Chelan.	Republic.
Chiwaukum.	Seattle.
Chopaka.	Seattle special.
Ellensburg.	Seattle land classification. <sup>1</sup>
Glacier Peak.	Skykomish.
Methow.	Snoqualmie.
Mount Adams.	Spokane.
Mount Aix.	Stehekin.
Mount Stuart.	Stilaguamish.
Mount Vernon.	Sumas.
Okanogan.	Tacoma.
Oakesdale.	Tacoma land classification. <sup>1</sup>
Osoyoos.	Umatilla.
Portland.	Winchester.
Pullman.	Zillah.

### PRECISE LEVELING.

**Cedar Lake, Ellensburg, Mount Stuart, Pasco, Prosser, Snoqualmie, Tacoma, Wallula, Yakima, and Zillah Quadrangles.**

**FRANKLIN, KING, KITTITAS, PIERCE, AND WALLA WALLA COUNTIES.**

The elevations in the following list were determined by a double-rodged primary-level line extended from a tide gage at Tacoma and corrected to accord with the adjusted transcontinental precise-level line of the United States Coast and Geodetic Survey as published in 1905.

The leveling was done by H. S. Crowe in 1898, except in the Snoqualmie quadrangle, which was done by H. K. Kalloch in 1897, and in the Mount Stuart quadrangle, which was done by F. L. Cole in 1896.

#### TACOMA QUADRANGLE.

**TACOMA SOUTHEAST ALONG NORTHERN PACIFIC RAILWAY TO ORTING, THENCE NORTHEAST TO BUCKLEY.**

	Feet.
Tacoma, city hall building, on top of coping of cornerstone of; cross.....	110. 240
Tacoma, in wall of city hall building, on northwest corner of Seventh Street and Pacific Avenue, southeast corner of building, 2 feet above sidewalk; aluminum tablet stamped "110 T".....	109. 968
Prescott, in front of station; top of rail.....	8. 9

<sup>1</sup> Shows wooded areas. No wholesale rate.



	Feet.
Reservation platform, at road crossing; top of rail.....	12. 5
Milepost 5,270 feet east of, in top of stone of stone culvert, 1 foot from east end of stone, 10.7 feet from center of south track; copper plug stamped "21 T".....	21. 893
Puyallup, northeast corner of building of J. P. Stewart & Sons, in fifth row of bricks above cornerstone, corner of Stewart and Meridian streets; aluminum tablet stamped "49 T".....	48. 931
Meeker Junction; top of rail at.....	60. 7
Alderton, 150 feet east of water tank, 23 feet north of center of wagon road, 36.6 feet from center of track, 4.7 feet from south corner of east-west fence; iron post stamped "89 T".....	89. 193
Orting, in front of station; top of rail.....	192. 1
Orting, 150 feet west of water tank, 34.2 feet from center of track on south side, 3 feet west of telegraph pole, 53 feet west of center line of Bridge Street; iron post stamped "198 T".....	198. 088
South Prairie, in front of station; top of rail.....	428. 5
South Prairie, 50.7 feet east of northeast corner of station at, 2.3 feet west of telegraph pole, 19.1 feet from center of track; iron post stamped "430 T".....	430. 150
Buckley, southwest corner of Collins & McNichol's butcher shop, on corner of River Avenue and Main Street; aluminum tablet stamped "723 T"....	723. 290
Buckley, in front of station; top of rail.....	724. 0

## CEDAR LAKE QUADRANGLE.

## BUCKLEY ALONG NORTHERN PACIFIC RAILWAY TO PALMER JUNCTION.

Enumclaw, 77.9 feet west of southwest corner of station, 3.1 feet east of mail crane, 31 feet west of center of line of Griffin Avenue; iron post stamped "742 T".....	742. 408
Enumclaw, in front of station; top of rail.....	742. 3
Veazie, 76.6 feet from main track, 15 feet from center of side track, on north side of main line and 50 feet east of road crossing; iron post stamped "777 T".....	777. 478
Palmer, 96.4 feet west of southwest corner of station, 5 feet west of mail crane, 10.4 feet from center of track, 20 feet west of center of road crossing; iron post stamped "882 T".....	882. 408

## PALMER SOUTHEAST ALONG NORTHERN PACIFIC RAILWAY TO HOT SPRINGS.

Green River, sixth crossing, 25 feet west of tunnel No. 7, on north corner of east bulkhead pier of steel bridge No. 210; copper bolt stamped "1046 T".	1, 046. 695
Canton, in front of station; top of rail.....	1, 203. 7
Canton, 8.2 feet east of east end of railroad toolhouse, 2 feet west of telegraph pole; iron post stamped "1205 T".....	1, 206. 081
Maywood, 2.2 feet east of southeast corner of section house, 4.1 miles east of Canton; iron post stamped "1335 T".....	1, 335. 997
Hot Springs, 56 feet east of southeast corner of station, 17.6 feet north of center of track, 3 feet west of telegraph pole; iron post stamped "1531 T" <sup>1</sup> .	1, 532. 099
Hot Springs, in front of station; top of rail.....	1, 930. 55

## SNOQUALMIE QUADRANGLE.

## HOT SPRINGS EAST ALONG NORTHERN PACIFIC RAILWAY TO CLEALUM.

Lester, in brick projection at southwest corner of roundhouse; aluminum tablet stamped "1614 T".....	1, 615. 089
Lester, in front of station; top of rail.....	1, 610. 7

<sup>1</sup> Bench mark found loose in 1904; reset in concrete.

Stampede, 75 feet southwest of station, 10 feet northwest of bluff on Deer Creek; iron post stamped "2776 T" <sup>1</sup> .....	Feet. 2, 777. 319
Stampede tunnel, at east end of; top of south rail at east end of snow shed.....	2, 834. 2
Martin, on bank above track, 40 feet east of station and 20 feet south of main track, 6 feet east of telegraph pole; iron post stamped "2782" <sup>1</sup> ....	2, 784. 012
Martin, in front of station; top of south rail.....	2, 776. 7
Snoqualmie wagon road, at intersection with Northern Pacific Railway, 12 feet north of track, 15 feet east of wagon road, 3.6 miles west of Easton; iron post stamped "2304".....	2, 305. 808
Easton, 90 feet northwest of northwest corner of station, 110 feet north of track at water tank, 80 feet south of general store and post office; iron post stamped "2166".....	2, 167. 621
Big Creek, 25 feet north of west pillar of signpost at siding, 35 feet north of main track, 150 feet east of trestle No. 56 over small creek; iron post stamped "2103".....	2, 104. 735
Nelson, 3 feet east of fence corner and 12 feet west of large pine tree, 205 feet south of track, 200 feet northeast of house of Peter Nelson, and 410 feet southwest by west from signboard "Nelson;" iron post stamped "2030".....	2, 031. 498

## MOUNT STUART QUADRANGLE.

## CLEALUM SOUTHEAST ALONG NORTHERN PACIFIC RAILWAY TO ELLENSBURG.

Clealum, in front of station; top of rail.....	1, 908. 8
Clealum, 84.5 feet west of center of front door of Reed House, 81.5 feet southeast from southeast corner of Clealum Mercantile Co.'s store, in SW. $\frac{1}{4}$ sec. 26, T. 20 N., R. 15 E.; iron post stamped "1905" <sup>2</sup> .....	1, 907. 184
Teanaway, in front of station; top of rail.....	1, 836. 0
Teanaway, 200 feet north of station, on section line 30 feet south of corner of secs. 4, 5, 32, and 33, T. 19 N., R. 16 E.; iron post stamped "1838"....	1, 838. 399
Bristol, west side of NW. $\frac{1}{4}$ sec. 13, T. 19 N., R. 16 E., 40 feet southwest of southwest corner of section house and under sign board "Bristol," 14.3 feet north of center of track; iron post stamped "1784".....	1, 785. 076
Dudley, in front of station; top of rail at joint.....	1, 703. 8
T. 19 N., R. 17 E., on south side of SE. $\frac{1}{4}$ sec. 34, 1.5 miles northwest of Thorp, at first road crossing, 140 feet north of railroad, close to wagon road; iron post stamped "1658".....	1, 659. 028
Thorp, in front of station; top of rail.....	1, 635. 4
Thorp, in NE. $\frac{1}{4}$ sec. 11, T. 18 N., R. 17 E., at intersection of Main Street and Taneum Creek road; iron post stamped "1634 T".....	1, 634. 269
Milepost 122, 1,830 feet east of, on cross on sandstone inside of frame tower on north side of railroad track and east of road crossing; stone stamped "U. S. + BASE".....	1, 584. 836
Masons; center of track at road crossing.....	1, 561. 6

## ELLENSBURG QUADRANGLE.

## ELLENSBURG SOUTHEAST ALONG NORTHERN PACIFIC RAILWAY TO THRALL.

Ellensburg, in front of telegraph office; top of rail.....	1, 510. 49
Ellensburg, in top of brick pier with stone coping in State Normal School grounds; bronze tablet stamped "1571 T".....	1, 571. 503
Thrall siding; base of rail center of main line.....	1, 442. 06

<sup>1</sup> Bench mark found loose in 1904; reset in concrete.<sup>2</sup> This bench mark is now under the band stand.

ELAH SOUTHWEST ALONG NORTHERN PACIFIC RAILWAY TO NORTH YAKIMA, THENCE  
SOUTHEAST TO YAKIMA.

Naches River, opposite where it empties into Yakima River, in center of west end of stone pier of railroad bridge; copper plug stamped "1090 T".	Feet. 1,090. 333
North Yakima, opposite station, in pilaster of northwest corner of entrance to city hall building on Front Street; aluminum tablet stamped "1067 T".	1,067. 230
North Yakima, in front of station; top of rail.....	1,067. 35

YAKIMA QUADRANGLE.

THEALL SOUTH ALONG NORTHERN PACIFIC RAILWAY TO ROZA.

Umtanum, 85 feet southwest of section house, 56 feet southwest of center of track; iron post stamped "1350 T".....	1,350. 072
Umtanum, in front of section house; top of rail.....	1,348. 95
Roza, opposite station, 198 feet west of telegraph office, 0.25 mile east of milepost 148; iron post stamped "1249 T".....	1,249. 308
Roza, in front of station; top of rail.....	1,249. 2

ROZA SOUTH ALONG NORTHERN PACIFIC RAILWAY TO SELAH.

Selah, 2.6 feet southwest of west corner of fence around section house, 18 feet from center of main track; iron post stamped "1147 T".....	1,147. 591
Selah, in front of section house; base of rail.....	1,148. 76

YAKIMA SOUTH ALONG NORTHERN PACIFIC RAILWAY TO PARKER.

Yakima, in front of telegraph office; base of rail.....	980. 29
Yakima, 1.25 miles north of bridge over Yakima River, 110 feet west of wagon road, 100 feet south of intersection of Fort Simcoe and Toppenish roads, 125 feet east of main line of Northern Pacific Railway, at corner of fence at cattle crossing; iron post stamped "937 T".....	937. 665

ZILLAH QUADRANGLE.

PARKER SOUTHEAST ALONG NORTHERN PACIFIC RAILWAY TO MABTON.

Parker siding, in front of signboard; base of rail.....	923. 0
Simcoe, 180 feet east of east end of station, 50.3 feet south of center of track, corner of fence; iron post stamped "855 T".....	855. 142
Simcoe, in front of station; top of rail.....	859. 1
Toppenish, in front of station; base of rail.....	757. 2
Toppenish, 108 feet east from northeast corner of station, 25 feet south of center of main track, near corner of fence; iron post stamped "755 T".....	755. 427
Road crossing, 30 feet south of center of road, 37 feet from center of track, 3 feet north of fifth post along west fence line; iron post stamped "717 T".....	716. 689
Satus, 26 feet southwest of southwest corner of platform of station, 30 feet south of center of track, 2.5 feet north of first telegraph pole south of station; iron post stamped "674 T".....	673. 995
Satus, in front of station; top of rail.....	675. 30
Milepost 198, opposite, 9 feet north of fence, 116 feet south of center of track; iron post stamped "717 T".....	716. 361
Mabton, in front of telegraph office; top of rail.....	716. 55
Mabton, at water tank, 2 feet east of fence around railroad section house, 35 feet north of center of track, 40 feet west of center line of wagon road at crossing of railroad; iron post stamped "715 T".....	715. 206

## WALLULA QUADRANGLE.

PASCO SOUTH ALONG NORTHERN PACIFIC RAILWAY TO HUNTS JUNCTION, THENCE ALONG OREGON RAILROAD & NAVIGATION CO.'S LINE TO OREGON-WASHINGTON STATE LINE 6.2 MILES SOUTHWEST OF WALLULA.

Milepost 236, 90 feet northeast of, 42 feet east of center of track, 5 feet north of telegraph pole; iron post stamped "342 A".....	Feet. 343. 157
Hunts Junction, 120 feet southeast of milepost 240, 36 feet east of track, 5 feet east of telegraph pole; iron post stamped "341 A".....	342. 775
Wallula, 18 feet north of center of station, 290 feet north of south end of bridge, 27 feet south of center of track at Northern Pacific connection; iron post stamped "322 A".....	323. 338
Milepost 208, 150 feet east of, 570 feet east of State line post, 18 feet south of track; iron post stamped "318 A".....	319. 163

NOTE.—The following additional bench marks in the Wallula quadrangle were placed by the Reclamation Service in 1904, the leveling being done by H. Bucher.

PASCO EAST ALONG SNAKE RIVER AND COUNTY ROAD AND ACROSS COUNTRY TO SEC. 11, T. 9 N., R. 31 E., THENCE NORTHWEST TO MILEPOST 221, NORTHERN PACIFIC RAILWAY (PORTION OF LINE).

Pasco, aluminum tablet set in round house, stamped "378 T".....	377. 796
T. 9 N., R. 30 E., NE. $\frac{1}{4}$ sec. 36, on highest point of hill about 500 feet north of road, marks the position of a triangulation station signal known as "Snake Signal;" iron post stamped "482 T".....	481. 708
T. 9 N., R. 31 E., south center of sec. 20, 60 feet north of road, 240 feet west of the east (upstream) end of a grove of locust trees situated on a flat between Snake River and the hills; iron post stamped "356 T".....	355. 647
T. 9 N., R. 31 E., NW. $\frac{1}{4}$ sec. 23, 250 feet from Snake River, on west side of county road, 20 feet south of private gate in fence; iron post stamped "408 T".....	407. 564
T. 9 N., R. 31 E., south quarter corner of sec. 11, 10 feet east of junction of roads, 2 $\frac{1}{2}$ feet from wire fence, on north side of road; iron post stamped "668 T".....	667. 351
T. 9 N., R. 31 E., NE. $\frac{1}{4}$ sec. 4, 0.8 mile northeast of junction of roads at preceding bench mark, on top of sand ridge, marks the position of a triangulation station signal known as "No. 7;" iron post stamped "752 T"....	751. 653
T. 10 N., R. 30 E., east-central part of sec. 25, on top of sand ridge, marks position of a triangulation station signal known as "No. 6;" iron post stamped "556 T".....	556. 257

## TRIANGULATION STATION NO. 6 NORTH AND WEST TO ELTOPIA.

T. 10 N., R. 31 E., 500 feet southeast of northwest corner of sec. 18, on ridge on west side of coulee; iron post stamped "675 T".....	675. 163
T. 11 N., R. 30 E., 550 feet a little west of north of southeast corner of, on sand ridge on west side of coulee; iron post stamped "708 T".....	707. 463
T. 11 N., R. 30 E., 1,250 feet west of north of southeast corner of SE. $\frac{1}{4}$ sec. 25, 2 miles south of point where road from Eltopia to Ryegrass Wells turns east to go up over high ridge on ridge; iron post stamped "592 T".....	591. 737

SEC. 11, T. 9 N., R. 31 E., NORTHEAST ALONG SECTION ROADS TO POINT NEAR FISHHOOK FERRY THENCE NORTH AND WEST TO ELTOPIA.

T. 9 N., R. 32 E., northwest corner of sec. 6, on south side of road by large fence post on east side of gate; iron post stamped "781 T".....	780. 303
T. 10 N., R. 32 E., at southeast corner of sec. 20, on north side of road, 2 feet from wire fence, 15 feet west of crossroads; iron post stamped "795 T"....	794. 960

	Page.
T. 10 N., R. 32 E., in south center of sec. 14, 1.3 miles northwest of Fishhook Ferry on Snake River, on north side of road near sign board between forks of road; iron post stamped "738 T" .....	737. 618
T. 10 N., R. 32 E., north-central part of sec. 3, 50 feet west of road at summit of ridge; iron post stamped "1136 T" .....	1, 135. 370
T. 11 N., R. 32 E., near center of sec. 22, 3 feet east of sign-board between forks of road, marked "Fishhook Ferry 6 miles" pointing down road to south, road to southeast leads to Paradise Ferry; iron post stamped "993 T" ...	992. 743
T. 11 N., R. 32 E., 900 feet north of southwest corner of sec. 17; 200 feet east of dim road turning off down coulee, on south side of road bystone and stake marked "R. A.," in coulee north of Ryegrass Wells; iron post stamped "811 T" .....	810. 412
T. 11 N., R. 31 E., north-central part of sec. 14, first post north of fence corner on north side of road, in bottom of large coulee, smaller coulee with road comes in from the north; iron post stamped "680 T" .....	679. 956
T. 11 N., R. 31 E., south-central part of sec. 7, 2.7 miles southeast of Eltopia, 40 feet east of forks of road on highest point of ridge, 15 feet north of road; iron post stamped "835 T" .....	834. 842

## AT FISHHOOK FERRY.

Fishhook Ferry, 120 feet east of Oregon Railroad & Navigation Co.'s track, 10 feet southeast of telegraph pole on hillside, telegraph pole is opposite crossing sign on railroad where road leads down to Fishhook Ferry landing; iron post.....	423. 749
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## PROSSER QUADRANGLE.

## MABTON EAST ALONG NORTHERN PACIFIC RAILWAY TO KIONA.

Byron siding, 350 feet south of milepost 208, near signboard "Mabton 7 miles, Globe 9 miles, Bickerton 27 miles," 150 feet from center of track, 2 feet from fence corner; iron post stamped "696 T" .....	696. 368
Prosser, 540 feet west of station, in corner of fence of railroad reservation at Sixth Street, in southwest corner of Block B, lot 8; iron post stamped "661 T" .....	661. 260
Gibbon, 171 feet north of station platform, 150 feet north of center of main track, 2 feet south of wire fence; iron post stamped "627 T" .....	627. 252
Chandler siding, 1.6 feet from southwest corner of fence around railroad section house, 15 feet from center of main line; iron post stamped "534 T" .....	534. 285

## PASCO QUADRANGLE.

## KIONA EAST ALONG NORTHERN PACIFIC RAILWAY TO PASCO.

Kiona, 12 feet west of west end of platform, 12 feet south of main track, in east corner of fence around fruit orchard in small park on railroad reservation; iron post stamped "515 T" .....	514. 689
Kiona, in front of station; base of rail.....	514. 7
Milepost 235, 31 feet north of; iron post stamped "640 T" .....	640. 251
Badger, in front of station; top of rail.....	681. 0
Through cut, south end of, 3 feet east of telegraph pole, 120 feet southeast of milepost 240; iron post stamped "605 T" .....	605. 017
Relief siding, 2 feet east of first telegraph pole southwest of signboard at, 920 feet west of mileboard 246; iron post stamped "567 T" .....	566. 841
Kennewick, 95 feet southeast of southeast corner of station, 51 feet north of center of track; 1.7 feet west of corner of fence around section house; iron post stamped "362 T" .....	361. 688

	Feet.
Kennewick, in front of station; top of rail.....	361. 8
Pasco, in northwest corner of brick roundhouse of Northern Pacific Railway Co., in center of third course of bricks above stone foundation; aluminum tablet stamped "378 T".....	377. 796
Pasco, in front of telegraph office; top of rail.....	381. 10

NOTE.—The following additional bench marks in the Pasco quadrangle were established by the Reclamation Service in 1904, the leveling being done by H. Bucher.

PASCO NORTHWEST UP COLUMBIA RIVER TO NORTHWEST CORNER T. 9 N., R. 29 E., THENCE NORTHEAST TO MILEPOST 221, NORTHERN PACIFIC RAILWAY.

Pasco, aluminum tablet set in round house, stamped "378 T".....	377. 796
T. 9 N., R. 29 E., northeast corner of sec. 27, south side of road, 2 feet from fence; iron post, stamped "362 T".....	361. 734
Timberman's Ferry, 0.3 mile from, about center of sec. 18, T. 9 N., R. 29 E., on east side of road, 1 foot from fence at fence corner at south corner of field; iron post stamped "387 T".....	386. 829
T. 9 N., R. 29 E., northwest corner of, on west side of road 3 feet north of fence corner; iron post stamped "463 T".....	462. 853
T. 10 N., R. 29 E., 1,600 feet a little south of west from northwest corner of sec. 30, on ridge 800 feet east of Columbia River (post marks the position of guide post No. 93); iron post stamped "509 T".....	508. 340
T. 10 N., R. 29 E., 620 feet south by 220 feet east of northwest corner of sec. 28, on top of sand ridge, marks position of guide post No. 22; iron post stamped "513 T".....	513. 213
T. 10 N., R. 29 E., near center of sec. 23, on highest point of ridge, marking the position of West Glade triangulation station guide post No. 18; iron post stamped "607 T".....	606. 427

PASCO EAST ALONG SNAKE RIVER AND COUNTY ROAD AND ACROSS COUNTRY TO SEC. 11, T. 9 N., R. 31 E., THENCE NORTHWEST TO MILEPOST 221, NORTHERN PACIFIC RAILWAY (PORTION OF LINE).

T. 10 N., R. 30 E., southwest corner of sec. 15, 2 feet from fence, 3 feet north of fence corner; iron post stamped "687 T".....	686. 349
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### PRIMARY LEVELING.

Asotin (30'), Oakesdale (30'), Pullman (30'), and Spokane Quadrangles.

GARFIELD, SPOKANE, AND WHITMAN COUNTIES.

The elevations in the following list were determined by primary leveling extended from Spokane, and accord with a new adjustment which raises the formerly published elevations at Spokane 1 foot.

The leveling was done as follows: Spokane quadrangle in 1898 by H. S. Crowe and J. H. Carlock, and in 1903 by E. M. Fry; Oakesdale, Pullman, and Asotin quadrangles in 1903 by E. M. Fry.

#### SPOKANE QUADRANGLE.

MARSHALL NORTHEAST ALONG NORTHERN PACIFIC RAILWAY TO SPOKANE.

	Feet.
Marshall, 100 feet northwest of railroad crossing and 100 feet east of post-office building; iron post stamped "2130 T".....	2, 131. 114
Milepost Wallula 157, Hope 89, 660 feet south of, 48 feet west of center of track, 2 feet south of fence, 90 feet southwest of cattle guard; iron post stamped "1857 T".....	1, 858. 285

	Feet.
Spokane, in front of Northern Pacific station; top of rail.....	1, 910. 4
Spokane, in front of Great Northern station; top of rail.....	1, 880. 9
Spokane, center of astronomic pier in courthouse grounds; aluminum · tablet stamped "1891 T".....	1, 891. 954
Spokane, in southeast corner of brick wall of station, in second course of brick above stone foundation, fourth row west from corner; bronze tablet stamped "1914 T".....	1, 914. 628

## SPOKANE EAST ALONG NORTHERN PACIFIC RAILWAY TO THE STATE LINE.

Milepost W. 166, H. 80, 60 feet northwest of, 40 feet north of railroad; iron post stamped "1953 T".....	1, 953. 856
Trent, 2 miles east of, 100 feet north of railroad at road crossing; iron post stamped "2041 T".....	2, 042. 323
Otis siding, 0.5 mile east of, at northwest corner of fence at road crossing, 50 feet north of center of track; iron post stamped "2083 T".....	2, 083. 758
Washington-Idaho State line, 0.3 mile west of, 200 feet north of railroad crossing; iron post stamped "2112 T".....	2, 112. 620

SPOKANE NORTH ALONG SPOKANE FALLS & NORTHERN RAILWAY TO DRAGON, THENCE  
ALONG HIGHWAY TO CHATTAROY.

Mead, 100 feet southwest of station, in line with telegraph poles; iron post stamped "1906 S".....	1, 906. 628
Dragon, 90 feet west of station, 20 feet east of road; iron post stamped "1745 S".....	1, 746. 372
Chattaroy post office, 1,500 feet east of, 30 feet southwest of Davis mill road crossing Great Northern Railway, in center of boulder 60 by 40 inches, 2 feet above surface; aluminum tablet stamped "1799 S".....	1, 799. 598

## CHATTAROY ALONG GREAT NORTHERN RAILWAY TO POINT 1 MILE NORTH OF MILAN.

Milan, 220 feet southeast of station, 160 feet northwest of post office, in fork of roads; iron post stamped "1779 S".....	1, 780. 427
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POINT NEAR MILAN EAST AND SOUTH ALONG HIGHWAY VIA MEDLER, FISH RANCH, SPIRIT  
LAKE, AND FISH LAKE TO BATHDRUM (PORTION OF LINE).

Elk post office, 4 miles east of, 60 feet northeast of fork of roads, 480 feet south of corner of secs. 13, 14, 23, and 24, T. 29 N., R. 44 E., in boulder 60 by 40 inches, 20 inches above surface of ground; aluminum bolt stamped "U. S. G. S. 2468 ft. S. B. M.".....	2, 468. 997
Elk post office, 7.5 miles east of, on summit of road 40 feet south of bend, 160 feet west of precipitous break in ridge, in boulder 40 by 30 inches, 20 inches above ground; aluminum bolt stamped "U. S. G. S. 3112 ft. S. B. M.".....	3, 113. 454
Washington-Idaho State line, 120 feet south of, 240 feet north of old bridge over Blanchard Creek, 20 feet north of road, in center of boulder 40 by 30 inches, 20 inches above ground; aluminum tablet stamped "2382 S".....	2, 382. 760

## SPOKANE NORTH ALONG HIGHWAY VIA TOMKINSON TRIANGULATION STATION TO MEAD.

Spokane, 2.5 miles north of, 20 feet east of fork of road, 280 feet northeast of spring west of road, in root of pine tree; nail.....	1, 903. 10
Tomkinson triangulation station, about 800 feet southwest of Thomas Tomkinson's house, 400 feet west of road, about 7 miles north of Spokane, in center of stone post; aluminum tablet stamped "2372 S".....	2, 372. 766
Mead, 2.5 miles southwest of, 70 feet northeast of junction of Mead road with Spokane and Clarks Mill road, in 12-inch pine tree 10 feet west of road; spike.....	1, 953. 04

Mead, 0.5 mile southwest of, north of forks of road to Spokane, in root of 24-inch pine tree; nail.....	Feet. 1, 925. 86
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## DRAGOON WEST AND SOUTH ALONG HIGHWAY TO TOMKINSON TRIANGULATION STATION.

Wayside, in northwest corner of Odd Fellows Hall, 2 feet above ground, in stone wall; aluminum tablet stamped "2065 S".....	2, 065. 877
Wayside, 5 miles south of, 20 feet north of forks of road, in root of 14-inch pine west of road; nail.....	2, 032. 30
Wayside, 9 miles southwest of, 80 feet east of road, in sec. 28, T. 27 N., R. 42 E., in center of boulder 60 by 40 inches, 2 feet above ground; aluminum bolt stamped "U. S. G. S. 2889 ft. S. B. M.".....	2, 890. 260

## CHATTAROY EAST ALONG HIGHWAY TO DAVIS MILL, THENCE SOUTH AND WEST TO POINT NEAR MEAD.

Chattaroy, 5 miles east of, 120 feet northwest of corner of secs. 20, 21, 28, and 29, T. 27 N., R. 44 E., 100 feet northwest of forks of road in boulder 60 by 36 inches, 2 feet above ground; aluminum bolt stamped "U. S. G. S. 2065 ft. S. B. M.".....	2, 065. 772
Davis house, 7 miles south of, 60 feet southwest of road crossing, in SW. $\frac{1}{4}$ sec. 27, T. 27 N., R. 44 E.; iron post stamped "1922 S".....	1, 922. 942
Mead, 2.5 miles northeast of, at northeast corner of crossroads, in Tps. 26 and 27 N., Rs. 43 and 44 E.; iron post stamped "1881 S".....	1, 882. 245

## POINT 4 MILES NORTHEAST OF MEAD ALONG HIGHWAY SOUTH AND EAST BY CIRCUITOUS ROUTE TO THE STATE LINE.

Newman Lake, 4.5 miles west of, 30 feet north of forks of road at top of hill, in root of 10-inch pine west of road; tack.....	2, 733. 21
Newman Lake, 0.5 mile north of, 60 feet southeast of schoolhouse, 8 feet north of road; iron post stamped "2151 S".....	2, 152. 256
Newman Lake, water surface.....	2, 131. 0
Newman Lake, 0.5 mile east of, 3 miles north of Northern Pacific Railway, 30 feet south of forks of road, 1,000 feet east of house, in center of boulder 30 by 20 inches, 1 foot above ground; aluminum bolt stamped "U. S. G. S. 2147 ft. S. B. M.".....	2, 147. 886

## POINT 7 MILES NORTHEAST OF MEAD SOUTH ALONG HIGHWAY TO NORTHERN PACIFIC RAILWAY.

Pleasant Prairie, east end of middle of triangle, center of crossroads; iron post stamped "2431 S".....	2, 432. 393
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## CHATTAROY NORTH ALONG HIGHWAY TO POINT NEAR MILAN.

Chattaroy, 500 feet south of, 4 feet north of road, in top of stone 20 by 10 inches, 6 feet above ground; cut cross.....	1, 702. 17
Chattaroy, 4.8 miles north of, northeast corner of forks of roads, in top of boulder 10 by 8 inches, 6 inches above ground; cross.....	1, 860. 94

## WAYSIDE ALONG HIGHWAY NORTH TO DEER PARK, THENCE SOUTHEAST ALONG SPOKANE FALLS &amp; NORTHERN RAILWAY TO DRAGOON.

Wayside, 4 miles northwest of, 10 feet northeast of corner secs. 27, 28, 33, and 34, T. 28 N., R. 42 E.; iron post stamped "2093 S".....	2, 094. 167
Deer Park, southeast corner of crossroads at station, 70 feet southeast of post office, 130 feet east of Spokane Falls & Northern Railway; iron post stamped "2117 S".....	2, 118. 021
Buckeye, in front of station; top of rail.....	1, 964. 70



DEER PARK NORTHEAST ALONG HIGHWAY VIA WEST BRANCH POST OFFICE TO POINT 1 MILE  
NORTH OF MILAN.

	Feet.
Corner of secs. 19, 24, 25, and 30; top of stone.....	2, 222. 18
Deer Park, 4.5 miles northeast of, 50 feet south of forks of roads, 80 feet west of county road, 170 feet northwest of corner of secs. 19, 20, 29, and 30, T. 29 N., R. 43 E.; iron post stamped "2268 S".....	2, 269. 467
Westbranch, 200 feet north of post office, 30 feet west of bridge over flume, in top of boulder 48 by 36 inches, 1 foot above ground and 3 feet north of road; aluminum bolt stamped "U. S. G. S. 1906 ft. S. B. M.".....	1, 907. 360

POINT NEAR OTIS ALONG HIGHWAY SOUTH 3 MILES, THENCE EAST VIA LIBERTY LAKE TO STATE  
LINE, THENCE NORTH TO NORTHERN PACIFIC RAILWAY.

Liberty Lake, 500 feet north of, 100 feet west of schoolhouse, 20 feet east of road; iron post stamped "2098 S".....	2, 099. 461
Liberty Lake; water surface.....	2, 054. 0

SOUTHEAST CORNER OF SEC. 18, T. 25 N., R. 45 E., SOUTH ALONG HIGHWAY 2 MILES, THENCE  
NORTHWEST ALONG HIGHWAY AND RAILROAD TO SPOKANE.

Sprague avenue road, 2.2 miles southwest of, 130 feet north of forks of road, 60 feet northeast of schoolhouse; iron post stamped "2131 S".....	2, 131. 575
Sprague avenue road, 4.8 miles southwest of, 100 feet south of forks, in root of 30-inch pine tree 4 feet east of road; spike.....	2, 331. 58
East Spokane, 80 feet west of post office, 20 feet south of road, 160 feet south of track; iron post stamped "1933 S".....	1, 933. 941

EAST SPOKANE SOUTHEAST ALONG TRACK OF OREGON RAILROAD & NAVIGATION CO. TO  
BUCKLEY.

Chester, 200 feet northwest of section house, 30 feet north of fork of roads, 60 feet north of track; iron post stamped "2011 S".....	2, 011. 761
Mica, in front of station; top of rail.....	2, 479. 72
Mica, 250 feet east of post office, 100 feet west of track, 80 feet south of fork of road, in center of boulder 50 by 30 inches, 30 inches above ground; aluminum bolt stamped "U. S. G. S. 2478 ft. S. B. M.".....	2, 479. 426
Freeman, 1.8 miles southeast of, 60 feet south of road crossing, 50 feet east of forks, 200 feet southwest of church; iron post stamped "2600 S".....	2, 601. 306

OLSEN SWITCH EAST ALONG HIGHWAY TO STATE LINE.

W. F. Horton's house, 50 feet south of road, 800 feet west of State line, in masonry in northeast corner; aluminum bolt stamped "U. S. G. S. 2690 ft. S. B. M.".....	2, 690. 742
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POINT 1.8 MILES SOUTH OF FREEMAN WEST ALONG HIGHWAY TO NORTHERN PACIFIC RAILWAY,  
THENCE NORTH TO MARSHALL.

Oregon Railroad & Navigation Co.'s track, 3 miles west of, 20 feet south of fork of roads, at top of hill, in center of boulder 28 by 12 inches, even with ground; aluminum bolt stamped "U. S. G. S. 2512 ft. S. B. M."..	2, 513. 128
Hangman Creek, 0.2 mile east of, 800 feet west of fork of road, south end of ridge, 20 feet north of road, in center of boulder 30 by 20 inches, even with ground; aluminum bolt stamped "U. S. G. S. 1927 ft. S. B. M."....	1, 928. 364
Hangman Creek, 2.2 miles west of, at top of hill 50 feet east of forks of road, 140 feet north of telephone line; iron post stamped "2454 S".....	2, 455. 336
Palouse branch of Northern Pacific Railway, milepost 4, 0.2 mile north of, 80 feet east of road crossing, 40 feet east of small bridge, 20 feet east of forks of road; iron post stamped "2272 S".....	2, 273. 250

## SPOKANE WEST ALONG GREAT NORTHERN RAILWAY 4 MILES.

	Feet.
Alta Vista, in front of station; top of rail.....	1, 823
Junction Great Northern and Seattle & Lake Shore railroads, 0.8 mile west of, 30 feet southwest of point of curvature, in north face of boulder 12 by 10 feet, 10 feet above ground; aluminum bolt stamped "U. S. G. S. 1903 ft. S. B. M." .....	1, 904. 254

## JUNCTION GREAT NORTHERN AND SEATTLE &amp; LAKE SHORE RAILROADS SOUTH 7 MILES.

Junction, 7.0 miles south of, 130 feet east of road crossing, 80 feet east of track, in center of boulder 30 by 20 inches, 20 inches above ground; aluminum bolt stamped "U. S. G. S. 2267 ft. S. B. M." .....	2, 267. 558
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## MARSHALL SOUTH ALONG NORTHERN PACIFIC RAILWAY TO GARFIELD (PORTION OF LINE).

Marshall, 100 feet northwest of railroad crossing; iron post stamped "2130 S" .....	2, 131. 047
Milepost No. 4, 0.2 mile north of, 50 feet east of track; iron post stamped "2272 S" .....	2, 273. 091

## LOCKWOOD SOUTH ALONG TRACK OF OREGON RAILROAD &amp; NAVIGATION CO. TO ROCKFORD.

Lockwood, 200 feet southwest of church, 60 feet south of road crossing; iron post stamped "2600 S" .....	2, 601. 306
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## OAKESDALE QUADRANGLE.

## MARSHALL SOUTH ALONG NORTHERN PACIFIC RAILWAY TO GARFIELD (PORTION OF LINE).

Davis ranch, 1,500 feet south of, 50 feet west of track, north side of county road crossing; iron post stamped "2381 S" .....	2, 381. 977
Spangle, northeast corner of Main and Second Streets, in brick building used as saloon, 4 feet from corner of building; bronze tablet stamped "2431 S" .....	2, 432. 417
Plaza, 200 feet west of station, 150 feet west of track, 200 feet southeast of post office, east side of Main Street; iron post stamped "2352 S" .....	2, 352. 520
Rosalia, in southeast corner of Bank of Rosalia Building, 2 feet north of entrance door, 2 feet from ground; bronze tablet stamped "2236 S" ....	2, 236. 713
McCoy's siding, 100 feet south of milepost No. 32, opposite side of road from warehouse, 2 feet from fence; iron post stamped "2402 S" .....	2, 402. 947
Oakdale, southwest corner of Main and First Streets, in wall of Commercial State Bank Building, 2 feet west of door and 2 feet above sidewalk; bronze tablet stamped "2464 S" .....	2, 464. 929
Belmont, 20 feet north of station, 50 feet east of track, near platform; iron post stamped "2502 S" .....	2, 502. 361
Garfield, 100 feet west of station, north side of Fourth Street, 5 feet from sidewalk; iron post stamped "2485 S" .....	2, 485. 220

## ROCKFORD SOUTH ALONG TRACK OF OREGON RAILROAD &amp; NAVIGATION CO. TO GARFIELD.

Rockford, 150 feet northeast of station, 50 feet south of track, 5 feet from board sidewalk; iron post stamped "2376 S" .....	2, 376. 642
Fairfield, 100 feet south of station, 5 feet west of platform, near telegraph pole; iron post stamped "2559 S" .....	2, 559. 032
Fairfield, in front of station; top of rail.....	2, 561
Latah, 100 feet north of station, west side of platform, 10 feet west of track; iron post stamped "2442 S" .....	2, 442. 369
Latah, in front of station; top of rail.....	2, 444

Tekoa, northeast corner of brick building occupied by Tekoa Mercantile Co., at corner of Main and Fourth Streets, 3 feet from sidewalk, 1 foot from corner; aluminum tablet stamped "2537 S".....		Feet.
Seltice, 15 feet south of station, 20 feet north of track; iron post stamped "2528 S".....		2, 537. 155
Farmington, 50 feet east of station, 20 feet south of track, at northwest corner of small park; iron post stamped "2629 S".....		2, 528. 921
Garfield, in front of station; top of rail.....		2, 629. 782
		2, 473

## SELTICE WEST ALONG TRACK OF OREGON RAILROAD &amp; NAVIGATION CO. TO SUNSET.

Thornton, 200 feet southeast of station, 30 feet west of grain warehouse No. 1, 10 feet east of track, at road crossing; iron post stamped "2297 S".....	2, 297. 100
Sunset, 100 feet west of station, 10 feet west of wagon road, 25 feet north of track, 600 feet south of post office, at railroad crossing, near crossing post; iron post stamped "2127 S".....	2, 127. 143

## POINT 1.5 MILES SOUTH OF SPANGLE EAST ALONG HIGHWAY TO FAIRFIELD.

Johns ranch, 200 feet northeast of house, south side of road, 2 feet from fence; iron post stamped "2506 S".....	2, 506. 633
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## SUNSET SOUTHEAST ALONG HIGHWAY TO GARFIELD.

"Cash up" Davis ranch, 100 feet southeast of house (old store building), 100 feet southwest of granary and barn, at forks of Colfax and Oakesdale road; iron post stamped "2348 S".....	2, 348. 904
Cottonwood schoolhouse, 1,000 feet east of, 50 feet west of Cottonwood church, at northwest corner of church yard; iron post stamped "2466 S".....	2, 466. 793

## THORNTON NORTH ALONG HIGHWAY TO ROSALIA.

Horn schoolhouse, 200 feet west of, 600 feet north of Fisk house, at corner of school yard, at forks of road; iron post stamped "2417 S".....	2, 417. 973
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## COTTONWOOD SCHOOLHOUSE SOUTHEAST ALONG HIGHWAY TO STEPTOE BUTTE.

Step toe Butte, summit of, 5 feet east of southeast corner of old hotel, 20 feet east of cistern, in large bowlder; aluminum tablet stamped "3613 S"....	3, 613. 956
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## PULLMAN QUADRANGLE.

## GARFIELD SOUTH ALONG TRACK OF OREGON RAILROAD &amp; NAVIGATION CO. TO PULLMAN.

Water surface under railroad bridge over Palouse River, June 27, 1903....	2, 415. 7
Palouse, 50 feet north of station, at north end of platform, 15 feet east of track, 200 feet south of milepost 59; iron post stamped "2432 S".....	2, 432. 739
Fallon, 50 feet west of platform, 150 feet southwest of grain warehouse, 5 feet north of porch to post office and store, west side of county road; iron post stamped "2488 S".....	2, 489. 386
Whelan, 3 feet south of southeast corner of station platform, 100 feet north-west of warehouse, at steps; iron post stamped "2510 S".....	2, 510. 952

## PULLMAN EAST ALONG NORTHERN PACIFIC RAILWAY TO MOSCOW.

Pullman Junction; rail at switch at junction of Lewiston branch and Genesee branch of Northern Pacific Railway.....	2, 371
Washington-Idaho State line, 15 feet north of track, in base of signpost "Washington-Idaho State line;" spike .....	2, 534. 13

## PULLMAN EAST ALONG NORTHERN PACIFIC RAILWAY TO GENESEE.

Chambers station, 1,000 feet south of platform, in northeast corner of stone foundation of public schoolhouse; bronze tablet stamped "2561 S".....	Feet. 2,562.484
Johnson, corner of Main and Dean Streets, in brick foundation of residence of J. M. Ellsworth, 10 feet east of door, 1.5 feet above ground; bronze tablet stamped "2628 S".....	2,629.060

## GARFIELD SOUTHWEST ALONG TRACK OF OREGON RAILROAD &amp; NAVIGATION CO. TO DIAMOND.

Palouse River; water surface, June 10, 1903.....	2,196
Elberton, 800 feet north of station, 200 feet west of fruit drier, 100 feet west of track at road crossing, west side of county road; iron post stamped "2188 S".....	2,188.840
Elberton, in front of station; top of rail.....	2,189
Colfax, in front of station; top of rail.....	1,965
Colfax, southwest corner of courthouse yard, 200 feet east of river, 2 feet east of stone steps, 5 feet north of sidewalk; iron post stamped "1965 S".....	1,965.547
Diamond, 200 feet east of platform, 600 feet north of hotel, 50 feet south of track, edge of right of way; iron post stamped "2041 S".....	2,041.857

## COLFAX SOUTHEAST ALONG TRACK OF OREGON RAILROAD &amp; NAVIGATION CO. TO PULLMAN.

Riverside, 75 feet south of warehouse, 25 feet west of county bridge over South Palouse River, 200 feet east of ranch house, north side of road near railroad; iron post stamped "2164 S".....	2,165.103
Bridge D-9; water surface, June 17, 1903.....	2,164
Guy, in front of station; top of rail.....	2,246
Guy, 450 feet south of station, 10 feet west of track, 50 feet west of Balfour, Guthrie & Co.'s warehouse, 10 feet south of county road; iron post stamped "2250 S".....	2,250.705
Pullman, 3 feet north of station platform, 15 feet west of track; iron post stamped "2341 S".....	2,342.374
Pullman, Washington Agricultural College, west side of main entrance to administration building, in granite pillar 2.5 feet above ground; bronze tablet stamped "2536 S".....	2,536.689

## COTTONWOOD SCHOOLHOUSE SOUTHWEST ALONG HIGHWAY TO DIAMOND.

Troup ranch, 300 feet east of house, at forks of road, 5 feet south of mail box, west side of road; iron post stamped "2316 S".....	2,316.574
Torrent ranch, 600 feet west of house, bridge over Palouse River (known as Torrent's bridge).....	1,773.03
Water surface under bridge, July 10, 1903.....	1,757
Torrent ranch, 500 feet west of house, 20 feet north of county road, at east end of steel bridge over Palouse River, near large pine tree; iron post stamped "1769 S".....	1,769.972

## COLFAX SOUTHWEST ALONG HIGHWAY TO WILCOX, THENCE SOUTHEAST TO PULLMAN.

Smith ranch, 300 feet southwest of barn, 1,000 feet west of house, west side of road at road forks; iron post stamped "2187 S".....	2,187.822
Wilcox, 150 feet west of post office and store, 100 feet south of blacksmith shop, at forks of road; iron post stamped "1812 S".....	1,812.754
Dunn ranch, 250 feet west of house, at gate, in root of elm tree; nail.....	1,858.43
Dowling bridge over Union Flat Creek, 300 feet north of, 1,000 feet north of Dowling house, at forks of road near mail box; iron post stamped "1996 S".....	1,997.096
Regan ranch, 300 feet south of house, 5 feet south of small stream, on east side of road, in root of cottonwood tree; spike.....	2,062.05

Saints Home, 0.2 mile northeast of, 50 feet east of Hamilton bridge over	Feet.
● Union Flat Creek, east side of road, in root of poplar tree; spike.....	2, 068. 09
T. 15 N., R. 44 E., sec. 31, at north quarter of, 2 miles west of Lewis Church; iron post stamped "2374 S".....	2, 375. 422
Spring Flat, Lewis Church, in foundation at northwest corner of, just west of entrance; bronze tablet stamped "2409 S".....	2, 409. 988

PULLMAN SOUTHWEST ALONG HIGHWAY TO WAWAWAI, THENCE SOUTHEAST VIA STEPTOE CANYON TO UNIONTOWN (PORTION OF LINE).

Fowler ranch, 0.2 mile east of house, south side of road, end of bridge over Union Creek; iron post stamped "2316 S".....	2, 316. 726
Klingard signal, 0.2 mile east of Klingard house, triangulation station on hill in wheat field; iron post stamped "2708 S".....	2, 708. 860
Wawawai, 1.5 miles east of, east side of road; top of large boulder.....	1, 456. 43
Wawawai, 0.2 mile west of post office, 100 feet north of ferryman's house, south of road at gatepost; iron post stamped "657 S".....	657. 733
Wawawai, 2 miles southeast of, 0.2 mile east of Snake River, west side of road; top of boulder.....	765. 64
O'Dell ranch, 200 feet northeast of house, 50 feet south of small stream, 2 feet inside of wire fence, in large boulder; bronze tablet stamped "719 S".....	719. 755
Bishop ranch, 0.2 feet west of house, in root of poplar tree at front gate; spike.....	695. 787
Alex-Indian ranch, 200 feet south of house, 1,000 feet east of river, west side of road; top of boulder.....	692. 24
Steptoe Canyon, 150 feet north of old corral, 20 feet east of creek, west side of road; top of large boulder.....	1, 776. 54
Nesterbank ranch, 0.25 mile west of house, 50 feet west of road, 10 feet west of small creek, in stone wall (natural), in field, west side of Steptoe Can- yon; bronze tablet stamped "2541 S".....	2, 541. 974
Colton, corner of Main and Second streets, northwest corner of Fraternity Block, 4 feet north of entrance to bank, 2 feet above sidewalk; bronze tablet stamped "2563 S".....	2, 564. 251
Uniontown, southeast corner of Montgomery and Spring streets, northwest corner of brick building occupied by First State Bank, 10 feet north of entrance, 2 feet above sidewalk; bronze tablet stamped "2574 S".....	2, 574. 646

WAWAWAI ALONG HIGHWAY BY CIRCUITOUS ROUTE VIA OFFIELD CANYON, KIRBY SCHOOL-  
HOUSE, AND ALPOWA TO STEPTOE CANYON (PORTION OF LINE).

Snake River, at Wawawai; water surface, August 22, 1903.....	629
Offield, at mouth of Offield Canyon, 600 feet north of house, 500 feet north- east of packing house, 0.25 mile west of Snake River, east side of road, near orchard fence; iron post stamped "671 S".....	672. 054
Overherd ranch, 150 feet south of house, 10 feet east of creek, west side of road, in root of cottonwood tree; spike.....	887. 54
Richardson ranch, 250 feet west of house, 350 feet south of barn, near fence east side of road, 5 feet south of locust tree; iron post stamped "2447 S".....	2, 448. 167
Kirby schoolhouse, 500 feet south of, 200 feet north of small creek, 1,000 feet northwest of ranch house, 20 feet west of wagon road, in stone; bronze tablet stamped "2427 S".....	2, 428. 401

ASOTIN QUADRANGLE.

PULLMAN ALONG HIGHWAY SOUTHWEST TO WAWAWAI, THENCE SOUTHEAST VIA STEPTOE  
CANYON TO UNIONTOWN (PORTION OF LINE).

Quast ranch, 200 feet north of house, 0.2 mile east of Snake River, 100 feet east of county road, in large boulder; bronze tablet stamped "748 S".....	749. 814
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WAWAWAI ALONG HIGHWAY BY CIRCUITOUS ROUTE VIA OFFIELD CANYON, KIRBY SCHOOL-  
HOUSE, AND ALPOWA TO STEPTOE CANYON (PORTION OF LINE).

Swenney ranch, 0.5 mile east of house, 20 feet northwest of road forks of Lewiston-Pomeroy stage road and road down Dead Man Gulch, in side fence corner; highest point of stone 10 by 8 by 6 inches.....	Feet. 2, 518. 99
Fannin ranch, 0.5 mile west of, at summit of divide between Alpava Creek and Pataha Creek, 50 feet south of forks of Pomeroy and Watertine Roads, south side of road near mail box; iron post stamped "2610 S".....	2, 611. 038
Alpowa post office, 15 feet north of, in yard of A. E. Lee's ranch, 3 feet west of front gate, 100 feet south of north fork of Alpowa Creek; iron post stamped "1322 S".....	1, 323. 209
Alpowa Canyon, 50 feet south of old house of Walker ranch, 150 feet north of creek, north side of road, in root of large poplar tree; spike.....	1, 069. 99
Alpowa Ferry, 1,000 feet west of landing, west side of Snake River, 100 feet northeast of house, 200 feet west of warehouse, south side of road, at corner of fence; iron post stamped "720 S".....	721. 090
Pate ranch, 1,000 feet north of house, 20 feet north of creek, in solid rock wall, at north side of road; bronze tablet stamped "1208 S".....	1, 209. 593

## Connell, Odessa, Othello, Pasco, Bitzville, and Rock Lake 30' Quadrangles.

## ADAMS, FRANKLIN, LINCOLN, AND SPOKANE COUNTIES.

The elevations in the following list were determined by primary leveling extended from the precise-level line of the United States Coast and Geodetic Survey at Pasco. The double-rodged line from Pasco to Spokane of this list was part of a line from Tacoma eastward along the Northern Pacific Railway and was re-covered by the Coast and Geodetic Survey between Pasco and Green River.

The leveling was done in 1898 by H. S. Crowe, except a part of that in the Connell quadrangle, which was done in 1903 by R. B. Shaw.

## PASCO QUADRANGLE.

## PASCO NORTH ALONG NORTHERN PACIFIC RAILWAY TO ELTOPIA (DOUBLE LINE).

Pasco, in northwest corner of brick roundhouse of Northern Pacific Railway, in center of third course of bricks above stone foundation; aluminum tablet stamped "378 T".....	Feet. 377. 796
Pasco, in front of telegraph office; top of rail.....	381. 1
Milepost "Wallula 20, Hope 226," 50 feet south of, 18 feet west of center of main track, 5 miles east of Pasco; iron post stamped "445 T".....	444. 745
Glade, opposite center of siding at; top of rail of main line.....	492. 8
Milepost "Wallula 25, Hope 221," 90 feet southeast of, 3.5 feet west of telegraph pole; iron post stamped "537 T".....	537. 309
Eltopia, 35 feet east of gate to section house, 33 feet from center of main track, 50 feet from tank house, 1.4 feet from fence; iron post stamped "591 T".....	590. 909
Eltopia, in front of water tank; top of rail.....	591. 3

## OTHELLO QUADRANGLE.

## ELTOPIA NORTH ALONG NORTHERN PACIFIC RAILWAY TO MESA (DOUBLE LINE).

Thorough cut, at south end of, 330 feet northeast of, milepost "Wallula 37, Hope 209," 5 feet north of telegraph post; iron post stamped "651"....	651. 275
Lake, in front of section house; top of rail.....	677. 6

Lake (Mesa) in northwest corner of fence at section house, 40 feet east of center of track, 180 feet north of the water tank; iron post stamped "677 T".....	Feet. 677.042
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## CONNELL QUADRANGLE.

## MESA NORTHEAST ALONG NORTHERN PACIFIC RAILWAY TO LIND (DOUBLE LINE).

Mesa, 4.6 miles northeast of, 50 feet southeast of center of track, opposite milepost "Wallula 46, Hope 200," 4 feet southwest of telegraph pole; iron post stamped "715 T".....	715.289
Connell station, 16 feet from northeast corner, between platform and telegraph pole, 16 feet southeast of center of track; iron post stamped "838 T".....	838.184
Trestle 194, 100 feet south of west end of, 12 feet north of telegraph pole, 400 feet northeast of milepost "Wallula 55, Hope 191," 50 feet south of center of track; iron post stamped "924 T".....	924.220
Hatton, near corner of fence east of schoolhouse, near center line of sec. 20, T. 15 N., R. 31 E., 100 feet west of center of track; iron post stamped "1077 T".....	1,077.453
Hatton, in front of telegraph office; top of rail.....	1,064.1
Scott station, 50 feet northeast from north corner, 2.5 feet north of telegraph pole near pump house, 50 feet east of center of main track; iron post stamped "1167 T".....	1,166.529
Scott, in front of telegraph office; top of south rail.....	1,166.6
Milepost "Wallula 68, Hope 178," 47 feet southeast of, near east line of railroad fence at road crossing, 60 feet east of center line of crossing, 33 feet east of center of main track; iron post stamped "1394 T".....	1,393.788
Providence, in front of section house; top of rail.....	1,537.7
Milepost "Wallula 73, Hope 173," 1,920 feet northeast of, 50 feet east of center of track, 10 feet north of telegraph pole at Farm crossing; iron post stamped "1476 T".....	1,476.427
Lind station, 28 feet from northwest side of tank house, in northeast corner of fence around and 50 feet east of corner of telegraph office, 21 feet northwest of center of track; iron post stamped "1362 T" <sup>1</sup> .....	1,362.560

## LIND WEST ALONG HIGHWAY TO ADAMS-GRANT COUNTY LINE.

Lind, 3.1 miles west of, 15 feet southeast of Lind Coulee Road, 120 feet southwest of bridge over Dry Creek; iron post stamped "1316 T".....	1,316.097
Lind, 5.6 miles west of, 15 feet southeast of Lind Coulee Road, 20 feet northwest of perpendicular bluff, 25 feet high, in top of large boulder; tablet stamped "1297 T".....	1,297.027
Lind, 9 miles west of, 20 feet northeast of Lind Coulee Road, on top of hill just above schoolhouse, in rock 3 feet 6 inches long by 6 inches above ground; tablet stamped "1325 T".....	1,324.470
Lind, 11.5 miles west of, 10 feet northeast of Lind Coulee Road, 100 feet southwest of gap in fence, in rock among a number of loose boulders; tablet stamped "1247 T".....	1,247.308
T. 17 N., R. 31 E., at center of east line of sec. 14, 10 feet west of Lind Coulee Road, 1 foot east of Knottingham's east fence, in rock 3 feet long set 2.5 feet in ground; tablet stamped "1202 T".....	1,201.776
Lind, 18.1 miles west of, 50 feet west of junction in forks of old Crab Creek or McManoman trails or roads; iron post stamped "1198 T".....	1,197.830
T. 17 N., R. 31 E., 350 feet west of center line in NW. $\frac{1}{4}$ sec. 6, 0.25 mile north of county road; iron post stamped "1204 T".....	1,203.797

<sup>1</sup> This bench mark was removed by track gang April 10, 1906, and placed under a tank, elevation not known.

## RITZVILLE QUADRANGLE.

## PAHA NORTHEAST ALONG NORTHERN PACIFIC RAILWAY TO SPRAGUE (DOUBLE LINE).

	Feet.
Milepost "Wallula 90, Hope 156," opposite; iron post stamped "1645 T" ..	1, 645. 383
Ritzville, 1.1 miles south of, 4 feet north of telegraph pole, 150 feet south-east of milepost "Wallula 95, Hope 151," 42 feet east of center of track; iron post stamped "1798 T" .....	1, 797. 947
Ritzville, in fifth row of bricks above stone foundation at north entrance to Adams County courthouse; aluminum tablet stamped "1820 T" .....	1, 820. 511
Ritzville, 4 miles east of, 45 feet northwest of milepost "Wallula 100, Hope 146," 50 feet north of center of track, 0.4 foot west of telegraph pole; iron post stamped "1848 T" .....	1, 849. 003
Iona, 2 feet east of railroad fence at, 123 feet north of center of track, 145 feet from north front of warehouse, 300 feet northwest of milepost "Wallula 104, Hope 142;" iron post stamped "1944 T" .....	1, 944. 083
Harriston siding, at west end of; head of block of switch.....	1, 928. 3
Harriston, 30 feet west of southwest corner of railroad section house, 50 feet north of center of track, 4 feet west of telegraph pole, 6 miles east of Iona; iron post stamped "1937 T" .....	1, 937. 191
Harriston, in front of section house; top of rail.....	1, 937. 3
Sprague Lake; water surface.....	1, 880
Harriston, 5.6 miles east of, 40 feet north of center of track, 7 feet west of telegraph pole, 60 feet south of railroad fence, 100 feet west of cattle guard where cattle cross under trestle to Sprague Lake; iron post stamped "1897 T" .....	1, 897. 630
Sprague, in brick wall of Grey's store, northeast corner of First and C Streets, ninth tier of bricks above sidewalk; aluminum tablet stamped "1899 T" .....	1, 899. 351
Sprague, in front of station; top of rail.....	1, 899. 2

## ROCK LAKE QUADRANGLE.

## SPRAGUE NORTHEAST ALONG NORTHERN PACIFIC RAILWAY TO CHENEY (DOUBLE LINE).

Sprague, 1 mile east of, 50 feet north of center of track, 4 feet west of telegraph pole at road crossing; iron post stamped "1936 T" .....	1, 937. 083
Kline, in front of section house; top of rail.....	2, 113. 1
Milepost "Wallula 127, Hope 119," 60 feet northeast of, 50 feet north of center of track, 6 feet southwest of telegraph pole, 50 feet west of east switch stand; iron post stamped "2147 T" .....	2, 148. 042
Tyler, 1.8 miles west of, 60 feet north of milepost "Wallula 132, Hope 114," 30 feet west of center of track; iron post stamped "2272 T" .....	2, 272. 621
Tyler, in front of telegraph office; top of rail.....	2, 292. 1
Milepost "Wallula 137, Hope 109," 20 feet from, 28 feet from center of track, 4.8 feet east of telegraph pole; iron post stamped "2284 T" .....	2, 284. 864
Milepost "Wallula 142, Hope 104," 390 feet northeast of, 40 feet south of center of track; iron post stamped "2353 T" .....	2, 353. 717
Cheney, in front of station; top of rail.....	2, 336. 0
Cheney, in northeast corner of First National Bank Building, corner of Main and D Streets, in top of eighth row of bricks above sidewalk; aluminum tablet stamped "2351 T" .....	2, 352. 622
Cheney, on right-hand side of portico entrance to Washington State Normal School, in eighth tier of brick above tile floor and 16 feet east of corner of wall; aluminum tablet stamped "2432 T" .....	2, 432. 825



## ODESSA QUADRANGLE.

## LIND NORTH ALONG NORTHERN PACIFIC RAILWAY TO PAHA.

Milepost "Wallula 85, Hope 161," 0.25 mile west of, 100 feet north of railroad track, 50 feet north of railroad fence, 40 feet north of center of wagon road; iron post stamped "1507 T".....	Feet. 1,507.508
Paha, in front of station; top of rail.....	1,563.9

## Chewelah, Colville, Davenport, Marcus, Reardan, and Wilbur Quadrangles.

## FERRY, LINCOLN, SPOKANE, AND STEVENS COUNTIES.

The elevations in the following list were determined by primary leveling extended from the precise-level line of the United States Coast and Geodetic Survey along the Northern Pacific Railway.

The leveling was done as follows: Marcus quadrangle in 1901 by E. M. Fry and R. A. Farmer and in 1905 by J. G. Hefty; Colville quadrangle in 1901 by Farmer and in 1905 by Hefty; Chewelah quadrangle in 1901 by Farmer; Davenport and Wilbur quadrangles in 1903 by Philo Holbrook, jr.; and Reardan quadrangle in 1898 by H. S. Crowe, in 1901 by Farmer, and in 1903 by Holbrook. The leveling by Hefty was done under the United States and Canada Boundary Commission and that by Holbrook under the United States Reclamation Service.

## COLVILLE QUADRANGLE.

## ARDON SPUR NORTHWEST ALONG SPOKANE &amp; NORTHERN RAILWAY TO MEYERS FALLS.

Colville, 120 feet west of station; iron post stamped "1582 S".....	Feet. 1,579.371
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RYAN NORTHEAST ALONG SPOKANE FALLS & NORTHERN RAILWAY TO BOUNDARY  
(DOUBLE LINE).

Ryan post office and store, in front of, at road crossing; top of rail.....	1,360.2
Milepost 117, 0.3 mile south of, 150 feet south of square water tank; top of rail.....	1,349
Milepost 119, 17 feet north of, 22 feet west of center of track; iron post stamped "1427 T".....	1,425.132
Marble post office, in front of, at road crossing; top of rail.....	1,463.7
Milepost 122, 6 feet north of second telegraph pole north of, 27 feet west of track, at section line between secs. 16 and 17, wagon road on top of bluff 200 feet higher; iron post stamped "1442 T".....	1,439.466
Milepost 124, across track from, about 20 feet south of, in rock cut in limestone at south end of cut above Little Dalles; aluminum tablet stamped "1356 T".....	1,354.229
Milepost 127, 20 feet northwest of, 10 feet from track; point of granite boulder.....	1,323.04
Milepost 127, 20 feet north of, 10 feet northwest of track, in granite boulder; aluminum tablet stamped "1325 T".....	1,323.012
Red Mountain Junction, at north switch; top of rail.....	1,320.6
Northport, in south end of, in southwest corner of block 7, on street next to railroad; iron post stamped "1335 T".....	1,332.945
Milepost 130, 10 feet west of track, at beginning of rock cut just north of smelter; point on rock.....	1,351.12
Trestle 78, center of, across large creek; top of rail.....	1,337.5

Milepost 132, 0.25 mile south of, 30 feet west of track, 6 feet from telegraph pole, near river bank, north end of tangent on Sand Flat; iron post stamped "1329 T".....	Feet. 1,326.819
Milepost 136, 6 feet from; iron post stamped "1338 T".....	1,336.632
Boundary, Washington, on international boundary line, on gravel flat near azimuth mark; iron post stamped "1356".....	1,354.138
Boundary; top of azimuth post.....	1,356.168
Boundary, at boundary line crossing; top of rail.....	1,352.6

## MARCUS QUADRANGLE.

## MEYERS FALLS NORTH ALONG SPOKANE FALLS &amp; NORTHERN RAILWAY TO RYAN (DOUBLE LINE).

Meyers Falls, 120 feet north of station; iron post stamped "1632 S".....	1,630.214
Meyers Falls, in front of station; top of rail.....	1,631
Meyers Falls, 0.9 mile north of, at road crossing, west side of track, in foot of crossing signpost; spike.....	1,571.98
Trestle 73, west guard rail of, bolt head in.....	1,457.53
Meyers Falls, 2.5 miles north of, under a rocky point filled with prospect holes and in little basin, wagon road at foot of grade below track, 56 feet east of track; iron post stamped "1423 T".....	1,421.140
Meyers Falls, 3.2 miles north of, at north end, west side, in guard rail of trestle No. 75; bolt head.....	1,355
Marcus, 200 feet south of station, east side of track, in root of pine; spike.....	1,260.23
Marcus, on edge of railroad right of way, 200 feet south of station, at end of unopened street, 75 feet from Mint Saloon; iron post stamped "1263 T".....	1,260.663
Marcus, 1.0 mile north of, opposite milepost 102, 50 feet east of track, in root of pine tree; spike.....	1,292.12
Marcus, 2 miles north of, 100 feet north of milepost 103, on bank next river; top of quartz boulder.....	1,271.28
Marcus, 3 miles north of, at north end of Seven Devils, wagon road 50 feet east of railroad track, at cabin, in root of pine tree; nail.....	1,262.71
Marcus, 3 miles north of, east of track, at west edge of wagon road, opposite a small cabin, in limestone boulder; aluminum tablet stamped "1275 T".....	1,273.263
Marcus, 5.8 miles north of, at county road crossing, north of wagon road, 40 feet west of track; iron post stamped "1349 T".....	1,346.731
Marcus, 8.5 miles north of, 40 feet north of track, opposite milepost 109, graveyard on opposite side of track, in root of pine tree; spike.....	1,383.39
Bossburg, 180 feet west of south end of station, at corner of lot; iron post stamped "1358 T".....	1,356.166
Bossburg, 2.0 miles north of, 7 feet east of track, 200 feet north of milepost 112; point on granite boulder.....	1,293.89
Bossburg, 3.0 miles north of, 50 feet north of track, at milepost 113, just north of limerock knoll behind which wagon road runs; iron post stamped "1278 T".....	1,275.766
Ryan post office, 0.5 mile south of, 10 feet east of milepost 116, 30 feet east of track; iron post stamped "1376".....	1,373.779

## MEYERS FALLS WEST ALONG STAGE ROAD TO KAYLOR POST OFFICE.

Kettle Falls, southwest corner of Franklin and Jefferson streets, 125 feet west of public-school house, in root of 10-inch pine tree; nail.....	1,307.17
Kettle Falls, Columbia River; surface of water, March 20, 1901.....	1,169

Weston ranch, 0.2 mile east of, 300 feet west of milepost 26, 6 feet south of road; iron post stamped "2537".....	Feet. 2, 535. 068
Sherman Hotel, 0.5 mile west of, 5 feet north of road at top of grade; iron post stamped "3709".....	3, 707. 246
Chilkoot Summit, 10 feet north of road summit; iron post stamped "5592".....	5, 595. 642

## CHEWELAH QUADRANGLE.

## CLAYTON NORTHWEST ALONG SPOKANE FALLS &amp; NORTHERN RAILWAY TO ARDON SPUR.

Loon Lake, 50 feet west of northwest corner of station; iron post stamped "2416 S".....	2, 417. 541
Springdale, at west end of station platform; iron post stamped "2086 S".....	2, 086. 885
Valley, 60 feet west of mail catch; iron post stamped "1670 S".....	1, 670. 786
Chewelah, 300 feet north of station, 150 feet south of milepost 65; iron post stamped "1668 S".....	1, 669. 266
Blue Creek, at northeast corner of post office; iron post stamped "1639 S".....	1, 636. 871
Addy, at road crossing, 150 feet south of milepost 74; iron post stamped "1635 S".....	1, 632. 724
Ardon, spur north of Ayer's barn, 15 feet east of track; iron post stamped "1605 S".....	1, 602. 494

## HEARDAN QUADRANGLE.

## DEER PARK NORTHWEST ALONG SPOKANE FALLS &amp; NORTHERN RAILWAY TO CLAYTON.

Clayton, in wall of engine room of Washington Brick, Lime & Manufacturing Co. Mills; bronze tablet stamped "2265 S".....	2, 265. 935
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## SPOKANE WEST DOWN SPOKANE RIVER TO CANYON SCHOOLHOUSE.

Spokane, 0.7 mile west of, upper side of track, 20 feet, stump marked "1654.16" (Great Northern bench mark).....	1, 900. 175
T. 26 N., R. 42 E., southeast corner of sec. 20, northwest of Spokane; iron post stamped "1677 T".....	1, 678. 758
Abbot schoolhouse, 75 feet north of Charles road; iron post stamped "1738 T".....	1, 738. 766
T. 27 N., R. 40 E., southeast corner of sec. 20; iron post stamped "1758 T".....	1, 759. 085
T. 27 N., R. 39 E., center of sec. 20, at Lazebrook's place, 150 feet from river bank; iron post stamped "1704 T".....	1, 705. 188

## MONDOVI EAST ALONG NORTHERN PACIFIC AND GREAT NORTHERN RAILWAYS TO SPOKANE.

Mondovi station; iron post stamped "2507 T".....	2, 508. 165
Reardan; iron post stamped "2497 T".....	2, 498. 249
Deep Creek station; iron post stamped "2308 T".....	2, 309. 120
Lyons, 0.5 mile south of, at crossing of wagon road, 20 feet from road, 25 feet from track; iron post stamped "2322 T".....	2, 323. 198

## CHENEY NORTH ALONG NORTHERN PACIFIC RAILWAY TO SPOKANE (DOUBLE LINE).

At junction of Y of Washington Central branch and Northern Pacific Railway.....	2, 322. 9
Cheney, 4.5 miles east of, 35 feet west of center of track, 5 feet north of telegraph pole, 60 feet southwest of road crossing; iron post stamped "2195 T".....	2, 196. 420

## DAVENPORT QUADRANGLE.

## CANYON SCHOOLHOUSE WEST DOWN SPOKANE AND COLUMBIA RIVERS TO CRESTON.

Canyon schoolhouse, 100 feet from, alongside of road; iron post stamped "1285 T".....	1, 285. 611
Halfway House on county road, 400 feet north of barn and near road to Davenport, 15 miles distant; iron post stamped "1553 T".....	1, 554. 145

T. 28 N., R. 37 E., quarter corner east side of sec. 19, at schoolhouse on road between Fort Spokane and Davenport; iron post stamped "1239 T".....	Feet. 1, 239. 731
Fort Spokane, 0.5 mile south of, on bench alongside of road running east and west in sec. 29, T. 27 N., R. 36 E.; iron post stamped "1672 T".....	1, 673. 320
Peach post office, 3.5 miles west of, at foot of road to Creston and down Columbia on Warren place; iron post stamped "1540 T".....	1, 541. 135

## CRESTON EAST ALONG NORTHERN PACIFIC RAILWAY TO MONDOVI.

Fellows station; iron post stamped "2329 T".....	2, 330. 101
Rocklyn station; iron post stamped "2385 T".....	2, 386. 341
Davenport; iron post stamped "2408 T".....	2, 409. 019

## WILBUR QUADRANGLE.

## POINT NEAR CRESTON WEST ALONG NORTHERN PACIFIC RAILWAY TO COULEE CITY.

Creston, 0.5 mile east of, at crossroads; iron post stamped "2444 T".....	2, 445. 318
Wilbur station; iron post stamped "2165 T".....	2, 166. 252
Govan station, at milepost 81; iron post stamped "2069 T".....	2, 070. 237
Almira station; iron post stamped "1916 T".....	1, 917. 391

## Chopaka, Nespelem, Okanogan, Osoyoos, and Republic Quadrangles.

## DOUGLAS, FERRY, AND OKANOGAN COUNTIES.

The elevations in the following list were determined by primary leveling forming part of a level net extending from the coast.

The leveling was done as follows: Republic and Osoyoos quadrangles in 1901 and 1902 by E. M. Fry and in 1903 by F. E. Fellows; Chopaka quadrangle in 1902 by Fry and in 1903 by Fellows; Nespelem quadrangle in 1901 by Fry; and Okanogan quadrangle in 1899, 1901, and 1902 by Fry, in 1903 by Fellows and W. R. Hill, and in 1904 by G. H. Kendall.

## OKANOGAN QUADRANGLE.

TWISP EAST ALONG HIGHWAY 16 MILES, THENCE NORTH TO SNOLDEN RANCH.<sup>1</sup>

Burke ranch, 1,000 feet east of house, 5 feet north of road, in root of pine tree; nail marked "2403".....	Feet. 2, 403. 70
Ramm ranch, 1,500 feet west of house, 5 feet north of road at forks of Twisp and Conconully and road to Ramm ranch, 1,000 feet north of Frazier Creek, 1 foot out of ground; iron post stamped "2495 T".....	2, 494. 895
Hancock ranch, 2 miles east of, 400 feet north of Frazier Creek, in root of pine tree on south side of road; nail marked "3201".....	3, 201. 19
Summit, 0.5 mile west of, in root of tree at north side of road; nail marked "3703".....	3, 703. 01
Summit of divide between Frazier Creek and Loop Loop Creek, 5 feet south of wagon road (Conconully and Methow Valley road); 1 foot out of ground; iron post stamped "4020 T".....	4, 020. 044
Summit, 1.5 miles east of, north side of road, in top of sawed stump; brass cartridge shell marked "3709".....	3, 709. 41
Milepost 4 (on Loop Loop and Methow road), 300 feet east of, south side of road, in root of fir tree; nail marked "3296".....	3, 295. 95

<sup>1</sup> This line closed 2.96 feet high and is unadjusted.

Old Cabin camp ground, 100 feet east of creek crossing, 300 feet south of old log cabin, 25 feet south of road, in notch in pine tree; nail marked "3244" .....	Feet. 3, 244. 68
Milepost 1, 500 feet east of, 1 mile west of Loop Loop bridge, north side of road, in root of fir tree; nail marked "2847" .....	2, 847. 48
Loop Loop Creek, junction of Conconully and Methow roads and Loop Loop and Okanogan roads, in root of tree on south side of road; nail marked "2431" .....	2, 431. 74
Loop Loop Creek, junction of Conconully and Methow road and Okanogan and Loop Loop roads, 5 feet west of roads and 50 feet east of creek; iron post stamped "2433" .....	2, 433. 052
Johnson ranch, 300 feet southeast of house, 250 feet east of bridge, south side of road, in root of tree; nail marked "2576" .....	2, 575. 87
Summit of divide between Loop Loop and Ruby creeks, 200 feet south of, 10 feet east of road, in large boulder; bronze tablet stamped "3081 T" ..	3, 081. 227

## ALTA LAKE ALONG ROAD NORTH AND WEST TO VROMAN RANCH.

Alta Lake, 300 feet south of, 100 feet west of road, 1,000 feet west of McCutchin's ranch house; iron post stamped "1201 T" .....	1, 201. 376
Methow River, 1 mile from, 50 feet west of road, on summit of hill south of Methow Valley, in root of 20-inch pine tree; nail .....	1, 220. 36
Methow River, 0.5 mile from, at intersection of road up Methow road to Ives Landing; on top of stone .....	1, 028. 08
Vroman ranch, in front of, 200 feet southeast of house, 200 feet east of shop, 100 feet north of State road; iron post stamped "1042 T" .....	1, 036. 64

## PATEROS SOUTHWEST ALONG WAGON ROAD TO ALTA LAKE (SPUR LINE).

Pateros, 100 feet southwest of post-office, 60 feet north of hotel; iron post stamped "780" .....	780. 120
Pateros Hotel, 0.3 mile southwest of, 35 feet south of Methow River, 4 feet north of road; top of pointed red rock marked "771" .....	771. 756
Pateros Hotel, 1 mile southwest of, 0.3 mile west of cabins on Methow River, 600 feet southwest of gully, foot of bank of first bench; small blue rock marked "1101" .....	1, 101. 53
Alta Lake, 700 feet northwest of, 0.3 mile southeast of house, 20 feet east of road, in green salt grass meadow; iron post stamped "1188" .....	1, 188. 055
Alta Lake, northeast end of; surface of water on September 25, 1903. ....	1, 175. 7

## POINT NEAR VROMAN RANCH NORTHEAST ALONG WAGON ROAD TO RIVERSIDE.

Pateros Wash, 100 feet southeast of post office at, 100 feet north of hotel and 0.25 mile northwest of mouth of Methow River, north side of street; iron post stamped "780" .....	780. 120
Columbia River; surface of water, August 17, 1901. ....	742. 7
Brewster Wash, 1.5 miles south of, north side of road near natural rock cut; top of large stone marked "817" .....	816. 97
Brewster Wash, southwest corner of Brewster Hotel, in stone foundation of hotel, which is on southeast corner of Second and Bruce Avenues; bronze tablet stamped "812" .....	812. 430
Davis ranch, in large granite stone at northeast corner of stone wall to basement of barn, 300 feet south of house, on Okanogan River; bronze tablet stamped "912" .....	906. 457
Chiliwest Creek, road crossing at, west side of road, in root of balm tree; nail marked "861" .....	854. 95
Malott post office and road house, 5 feet north of northeast corner of house and 50 feet west of stage road; iron post stamped "845" .....	839. 015

Reilly ranch, center of lane, 500 feet north of house and 200 feet west of barn, in place; top of stone marked "830" .....	Feet. 823. 61
Reilly ranch, 1 mile north of, 10 feet east of road; top of boulder marked "837" .....	831. 00
Alma, 300 feet south of store and post office, at corner of fence, 50 feet east of road, 0.25 mile south of Salmon River; iron post stamped "895" .....	887. 740
Richardson ranch, 20 feet north of barn, 75 feet south of irrigation ditch, side of road; on top of large stone marked "1272" .....	1, 264. 25
Pogue ranch, 1 mile north of, west side of road; on top large stone marked "1303" .....	1, 295. 88
Pogue ranch, 2.5 miles north of, at forks of road; top of stone marked "1323" .....	1, 315. 02
Riverside Wash, 2 miles south of, 500 feet east of road, 0.25 mile south of Roger's cabin in Pogue Flat, at quarter section corner; iron post stamped "1331" .....	1, 322. 995

THOMPSON RANCH ON OKANOGAN RIVER EAST AND SOUTH BY CIRCUITOUS ROUTE TO BRIDGE-  
PORT FERRY, THENCE NORTHWEST ALONG HIGHWAY TO CENTRAL FERRY.

Indian cabins, 0.8 mile north of, 400 feet east of river, 50 feet east of road, 200 feet west of granite cliff; top of granite rock marked "806" .....	806. 73
Okanogan River, 1.25 miles east of, 200 feet east of gully, 50 feet east of road, near granite outcrop; top of granite boulder marked "1235" .....	1, 235. 09
Okanogan River, 2.5 miles east of, 600 feet west of meadow and spring, in small gap, 5 feet south of trail; granite boulder marked "1771" .....	1, 770. 94
East end of long meadow, at cabin, 120 feet west of; top of round granite boulder marked "2008" .....	2, 008. 31
Deffland Ferry, 4.5 miles east of, 0.25 mile east of cabin at east end of meadow, 200 feet east of tall lava rock with three pyramids on top, in large granite boulder; bronze tablet stamped "2137" .....	2, 136. 529
Cabin in meadow, 1.25 miles east of, 0.5 mile west of summit at head of ravine, in ravine at turn; black basalt boulder marked "2287" .....	2, 287. 46
Two Lakes, 1.5 miles south of, 600 feet southeast of spring, in granite boulder on small knoll; aluminum tablet stamped "2524" .....	2, 524. 109
Upper north end of long flat meadow between low ridges, 15 feet south of rock; on large basalt boulder with bushes on top marked "2513" .....	2, 512. 85
Colville Reservation summit, 0.25 mile south of large rock with two pyramids, 0.25 mile west of large rock with bushes on top, near head of ravine, in granite rock; aluminum tablet stamped "2504" .....	2, 503. 640
Columbia River, 2.5 miles west of, in amphitheater, 1,000 feet west of black rock slide, 600 feet north of head of gully breaking into Columbia Valley; top of granite marked "2249" .....	2, 249. 03
Columbia River, 2 miles west of, 1 mile south of pines on slope, 600 feet north of spring gully; on large low lava rock marked "1872" .....	1, 872. 46
Bridgeport, 6 miles northeast of, 0.25 mile northwest of road, 1,000 feet south of spring, on rocky point, in basalt rock; aluminum tablet stamped "1249" .....	1, 248. 612
Indian cabin, 1 mile northeast of, 1,000 feet west of road and mouth of coulee, 30 feet south of gully; on top of basalt boulder on small bench marked "1088" .....	1, 089. 072
Bridgeport Ferry, 2.5 miles northeast of, 1,000 feet east of Indian tepee and spring, 40 feet east of road, 20 feet west of granite outcrop; iron post stamped "969" .....	969. 122
Bridgeport Ferry, 1 mile east of, 70 feet north of road, point of ridge; on granite boulder marked "933" .....	932. 52
Bridgeport Ferry, 500 feet east of north tower, at junction of road; iron post stamped "843" .....	842. 739

Bridgeport, 0.8 mile west of, 2,000 feet southeast of south ferry tower, at road junction; iron post stamped "817 T" .....	Feet. 816. 666
Bridgeport, 2.25 miles northwest of, 100 feet south of road, foot of small rocky point; on granite rock marked "932" .....	931. 67
Bridgeport, 3.5 miles west of, top of hill east of Koepp ranch, at road center; iron post stamped "934-5" .....	934. 086
Koepp ranch, 0.3 mile southeast of, at foot of hill, 15 feet south of road; on granite rock marked "825" .....	824. 633
Brewster Ferry, 4.0 miles east of, 1,500 feet northeast of Cobb ranch house, road branch north into Cobb ranch; iron post stamped "794" .....	793. 561
Brewster Ferry, 1.25 miles east of, 4 feet north of road, in grassy hollow; on top of white granite marked "769" .....	767. 99
Brewster Ferry, 0.25 mile east of, 800 feet east of road junction, 8 feet east of road; on white granite marked "821" .....	818. 98
Central Ferry, south tower, 1,000 feet southeast of, 200 feet east of gully, at road junction to ferry, 100 feet northeast of; iron post stamped "818 T" ...	816. 843

## CENTRAL FERRY (WEST OF BREWSTER) SOUTH ALONG WAGON ROAD 3 MILES (SPUR LINE).

Central Ferry, 0.7 mile south of, southeast corner of barn at; on small stone marked "1102" .....	1, 101. 37
Columbia River, 1.5 miles south of, 800 feet south of schoolhouse, 4 feet west of road; white rock marked "+1305" .....	1, 304. 06
Central Ferry, 2.5 miles south of, 1.0 mile south of schoolhouse, 1,000 feet north of small house, 60 feet west of spring branch, east side of road; iron post stamped "1736" .....	1, 735. 331

## MALOTT WEST ALONG HIGHWAY TO OGLESBY RANCH, NEAR RED SHIRT.

Malott, 1.5 miles southwest of, 6 feet south of road; old bench mark on flat rock in place opposite cliff marked "820" .....	813. 69
Stage road on Okanogan, 1.0 mile northwest of, 50 feet north of road, on first bench north of horseshoe bend in road; on granite bowlder marked "1312" .....	1, 311. 68
Stage road at Chiliwist Creek, 2.3 miles northwest of, 0.25 mile northeast of White ranch, 6 feet east of road; flat rock marked "1511" .....	1, 510. 83
Schoolhouse, 0.8 mile southeast of, 1,700 feet northwest of Indian cabin, 16 feet west of road, in root of fir tree; nail marked "1693" .....	1, 693. 40
Schoolhouse, 150 feet northeast of, 20 feet northwest of road, in root of large pine tree; nail marked "1960" .....	1, 959. 61
Schoolhouse, 2,900 feet northeast of, 0.7 mile east of Mason ranch, 15 feet southeast of crossroads, in root of pine tree; nail marked "2034" .....	2, 033. 59
Schoolhouse, 0.8 mile northeast of, 0.25 mile east of Mason ranch, 130 feet northeast of fence corner, 30 feet east of road, in cleft rock; bronze tablet stamped "2036" .....	2, 036. 445
Deneen ranch, west side bars, 550 feet northwest of, 50 feet west of road, in group of rock; on rock in place marked "2398" .....	2, 398. 06
Deneen ranch, 1.0 mile northwest of, 0.25 mile southwest of Wenner cabin, 20 feet east of road, on big flat, in root of pine tree; nail marked "2620" ..	2, 620. 32
Wenner cabin, 0.5 mile west of, at foot of steep hill to summit, 500 feet south of road, 40 feet northeast of, in granite rock among group of bowlders; aluminum tablet stamped "2720" .....	2, 718. 784
Summit of Chiliwist road, 0.8 mile north of, 12 feet north of road, bench foot of steep rise, in root of pine tree; nail marked "3007" .....	3, 006. 442
Summit of Chiliwist, Silver road at, 20 feet south of road, in granite bowlder; aluminum tablet stamped "3810" .....	3, 810. 054

Summit, 1.0 mile west of, 600 feet north of turn in road at foot of steep rise, 10 feet east of road; top of rock marked "3595" .....	Feet. 3, 594.43
Summit, 2.0 miles northwest of, 0.25 mile south of grassy meadow, 30 feet east of road, on small ridge, in root of pine; nail marked "3536" .....	3, 535.37
Silver stage road junction, 3.8 miles east of, 6 feet south of road, east side of flat, in root of pine; nail marked "3378" .....	3, 377.27
Silver stage road junction, 2.5 miles east of, 0.25 mile west of road through balm trees, 50 feet north of road, in root of pine tree; nail marked "3359" ..	3, 359.26
Silver stage road junction, 1.5 miles east of, 0.25 mile northwest of road through saddle, 50 feet north of road, group of moraine boulders, in granite rock; aluminum tablet stamped "3174" .....	3, 174.966
Junction of Silver-Brewster stage road and Chiliwist Creek road, 5.5 miles east of Silver, in root of fir; nail marked "2582" .....	2, 581.62
Lyde ranch, 1.3 miles east of, north side of road, at granite outcrop; on top of boulder marked "2278" .....	2, 277.21
Lyde ranch house, 0.25 mile east of, 6 feet north of road, corner of wire fence at, in root of pine; nail marked "2025" .....	2, 024.53

## RUBY SOUTHEAST ALONG HIGHWAY TO ALMA.

Ruby, 1.5 miles south of, 0.5 mile north of Broughton ranch, 6 feet west of road; top of large boulder marked "1735" .....	1, 731.98
Broughton ranch, 0.5 mile south of, 1,000 feet south of bridge, 4 feet west of road, in root of pine; nail marked "1706" .....	1, 702.72
Jones ranch, 3,400 feet south of, 8 feet west of road, in root of large pine tree; nail marked "1521" .....	1, 518.26
Clover schoolhouse, 400 feet northeast of, 600 feet south of road junction, 1,000 feet north of bridge over Salmon Creek, 100 feet east of road, in top of large rock; bronze tablet stamped "1425" .....	1, 421.767
Clover schoolhouse, 3,000 feet southeast of, 2,816 feet northwest of Osten- berg ranch, 4 feet north of road; top of rock marked "1479" .....	1, 475.59
Alma, 3.0 miles northeast of, 460 feet southeast of road junction, 100 feet northwest of falls in irrigation ditch, 20 feet west of road; on flat rock marked "1361" .....	1, 357.70
Alma, 150 feet southwest of store and post office, at fence corner; iron post stamped "895" .....	887.740

RIVERSIDE SOUTHEAST ALONG ROAD UP JOHNSON CREEK TO WATER RANCH.<sup>1</sup>

T. 35 N., R. 26 E., sec. 32, 600 feet west of Water ranch house, 300 feet north of Johnson Creek, 10 feet south of road, in large boulder; bronze tablet stamped "1332 T" .....	1, 331.278
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## CHOPAKA QUADRANGLE.

SNOLDEN RANCH ALONG HIGHWAY NORTHEAST TO BOONE RANCH, THENCE NORTHWEST TO  
CONCONULLY, THENCE SOUTHWEST TO SNOLDEN RANCH.

Ruby City schoolhouse, 1,000 feet northeast of, 500 feet east of bridge over creek, 10 feet west of road, in root of pine tree; nail marked "1880" ....	1, 876.831
Conconully, 3.0 miles southeast of, at northeast corner of Boone ranch, 25 feet west of road forks of Conconully-Riverside and Conconully-Brewster stage roads, in corner of fence; iron post stamped "2036" .....	2, 033.632
Conconully, 0.8 mile east of, top of steep grade on Brewster road, north side of road, in root of fir; nail marked "2382" .....	2, 379.28

<sup>1</sup> Line run twice.



Conconully, 600 feet north of schoolhouse at forks of Brewster stage road and Loop Loop road, in cottonwood tree; nail marked "2294" .....	Feet. 2, 291. 26
Conconully, 2.0 miles south of, 50 feet west of West Fork of Salmon Creek, 4 feet south of road; top of boulder marked "2348" .....	2, 345. 36
Milepost 3, 25 feet east of, 3 feet south of road, in root of fir tree; nail marked "2728" .....	2, 724. 94
Old log cabin, 100 feet south of, 50 feet east of road, in root of fir tree; nail marked "3103" .....	3, 100. 654
Milepost 6, 200 feet east of; top of boulder in road, marked "3236" .....	3, 233. 44

CONCONULLY ALONG HIGHWAY NORTH TO FISH LAKE, THENCE EAST TO WAGONROAD COULEE,  
THENCE SOUTH TO RIVERSIDE.

Conconully (Okanogan County) courthouse, 10 feet north of front gallery, 6 feet west of steps; iron post stamped "2361" .....	2, 358. 343
Conconully, 1.5 miles east of, 500 feet north of lake, 20 feet north of road, in root of pine tree; nail marked "2329" .....	2, 325. 79
Summit, 0.25 mile south of, east side of road, in tree; nail marked "2340" ..	2, 337. 51
Old sawmill site, 0.25 mile south of, 25 feet west of road, in root of fir tree; nail marked "2232" .....	2, 229. 40
Speckman ranch, 50 feet south of house, 50 feet north of barn, east side of road, in root of tamarack tree; nail marked "1827" .....	1, 824. 26
Speckman ranch, 400 feet north of house, at forks of road up Fish Lake and the Loomis-Conconully stage road, 0.5 mile north of Fish Lake; east side of road; iron post stamped "1822" .....	1, 819. 417
Sehalon ranch, 400 feet north of house, 0.25 mile east of Fish Lake, 50 feet south of road, in root of pine tree; nail marked "1811" .....	1, 808. 37
Noyes ranch, 400 feet north of house, 20 feet north of road, at summit of divide at head of Pine Creek, in root of cottonwood tree; nail marked "2182" .....	2, 179. 86
Mud Lake; surface of water, November 20, 1902 .....	2, 116. 5
Reed's store, 50 feet south of, 125 feet north of road, 0.25 mile east of forks of road up north fork of Pine Creek and road up south or main fork of Pine Creek; iron post stamped "2119" .....	2, 116. 395
Fate ranch, 150 feet south of east gate to, at northwest corner of log schoolhouse; top of corner stone marked "2024" .....	2, 021. 85
Wagonroad Coulee, 4.0 miles north of Riverside Wash, 75 feet east of road, 0.5 mile east of small lake; iron post stamped "1230" .....	1, 222. 008
Riverside, on west bank of Okanogan River, 5 feet north of road to ferry; iron post stamped "865" .....	857. 257

FISH LAKE ALONG HIGHWAY NORTH TO LOOMIS, THENCE EAST TO OROVILLE.

Cockron ranch, 30 feet west of barn, 300 feet east of house, 60 feet east of gate, 700 feet north of north end of Blue Lake, east side of road; iron post stamped "1683" .....	1, 680. 538
Hall ranch, 600 feet south of house, 50 feet east of road, in root of pine tree; nail marked "1500" .....	1, 497. 33
Chilson ranch, 1.0 mile south of, 10 feet east of road, 200 feet east of creek, on large boulder; chisel mark marked "1411" .....	1, 407. 58
Hall ranch, 600 feet south of house, 50 feet east of road, 10 feet south of bearing tree to sec. 26, T. 38 N., R. 25 E.; iron post stamped "1501" .....	1, 498. 474
Chilson ranch, 300 feet south of gate, east side of road; top of stone marked "1332" .....	1, 328. 39
Loomis, northeast corner of post office, on south side of main street, 15 feet west of front door of Loomiston Trading Co.'s store, at edge of sidewalk; iron post stamped "1310" .....	1, 306. 478

Riley ranch, at northeast corner of, 20 feet south of Oroville road, 10 feet west of sheep chute road, in post; nail marked "1419" .....	Feet. 1,415.83
Spectacle Lake, at west end of; surface of water, October 27, 1902 .....	1,347.8
Bright Spot Mining Camp, 1,000 feet south of bunk house and tunnel, 50 feet southeast of road, at top of steep grade; iron post stamped "1916 T" ..	1,909.470
Golden, 2.0 miles south of, 0.25 mile west of lake, 10 feet west of road; top of stone .....	1,931.96
Wannacut Lake; surface of water on November 14, 1901 .....	1,845.5
Golden, 10 feet south of porch to old store, 300 feet north of Spokane mill, 10 feet north of road; iron post stamped "1891 T" .....	1,884.310

## RILEY RANCH (EAST OF LOOMIS) ALONG HIGHWAY SOUTHEAST TO POINT NEAR TONASKETT.

Barberry ranch, 1.0 mile south of, 50 feet east of road; on top of large boulder .....	1,685.75
King ranch, 0.5 mile north of, 150 feet east of road; top of large boulder ..	1,603.13
Loyd Beall ranch, 300 feet north of house, 25 feet northeast of corral, 15 feet east of road; iron post stamped "1459" .....	1,455.565

## LOYD BEALL RANCH SOUTHWEST TO AENEAS CREEK AND LAKE (SINGLE SPUR LINE).

Aeneas Creek, crossing of county road (Tonaskett and Conconully road), 100 feet south of creek ford, 50 feet southeast of road, on side of hill; top of boulder marked "1389" .....	1,385.71
Aeneas Lake; surface of water on December 2, 1902 .....	1,358.0

## LOOMIS ALONG HIGHWAY NORTHWEST UP SIMILKAMEEN RIVER TO CANADIAN BOUNDARY (SPUR LINE).

Loomis, 2.0 miles north of, 50 feet east of road, on high point, in root of lone pine tree; nail marked "1277" .....	1,274.381
Alderman ranch, 1,000 feet north of house, 10 feet east of road; top of large boulder marked "1192" .....	1,188.87
Palmer Lake; surface of water at south end on October 30, 1902 .....	1,147
Pitman ranch, 1,000 feet west of house, 12 feet north of gate, 300 feet east of Palmer Lake, on east side of road; iron post stamped "1177" .....	1,173.673
Pershall ranch, 500 feet west of house, 100 feet west of road, 150 feet east of Palmer Lake, in root of pine tree; nail marked "1162" .....	1,159.43
Thein ranch, 150 feet north of house, 5 feet north of road, 100 feet from lake; top of boulder in place marked "1190" .....	1,186.617
Edwards ranch, 0.25 mile south of house, at forks of road, up Similkameen River and road down river to Nighthawk post office; iron post stamped "1166 T" .....	1,163.121
Golden Zone stamp mill, 800 feet southeast of, 200 feet west of road; point on large boulder marked "1200" .....	1,196.65
International Boundary Line, 0.25 mile south of, 300 feet northeast of Indian cabin, 3 feet east of road, 0.25 mile west of Similkameen River; iron post stamped "1197" .....	1,194.316

## PALMER LAKE NORTH ALONG HIGHWAY DOWN SIMILKAMEEN RIVER TO CANADIAN BOUNDARY.

Clark ranch, 0.25 mile west of, 3 feet south of road, 10 feet east of telephone pole; top of boulder .....	1,412.19
Blue Lake, 150 feet south of, 10 feet north of road; top of stone .....	1,794.85
Blue Lake, surface of water on November 13, 1901 .....	1,764.7
Blue Lake, 0.25 mile south of, 4 feet east of road; top of boulder .....	1,852.47

## OSOYOOS QUADRANGLE.

## TONASKET ALONG HIGHWAY NORTHWEST TO BRIGHT SPOT MINING CAMP.

	Feet.
Tonasket, 2.0 miles west of, 10 feet west of road; iron post stamped "1322 T" .	1, 314. 998
Watkins ranch, 100 feet east of corral, 25 feet east of road near section corner; top of stone.....	1, 320. 29

## TONASKET NORTH ALONG HIGHWAY TO OROVILLE.

Tonasket post office, 200 feet southeast of, 150 feet north of barn, near ferry derrick, on west bank of Okanogan River; iron post stamped "904" ....	895. 875
Griffin ranch, 0.25 mile west of house at mouth of lane, 30 feet west of road, 0.5 mile west of Okanogan River; iron post stamped "958 T" .....	950. 708
McDonald ranch, 1.5 miles south of, 0.25 mile south of Loomis road forks, 20 feet east of road; top of large boulder marked "984" .....	976. 84
Batomly ranch, southwest of house, 15 feet west of road, about 0.5 mile west of Okanogan River; iron post stamped "945 T" .....	937. 162
Batomly ranch, 0.25 mile west of house, 10 feet west of road; top of large boulder marked "968" .....	960. 99
Similkameen River; surface of water.....	911

## OROVILLE SOUTHWEST ALONG HIGHWAY TO BLUE LAKE.

Monroe ranch, 1.0 mile west of, 5 feet north of road, in bottom of telephone pole; nail marked "1342" .....	1, 334. 36
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## RIVERSIDE NORTHEAST ALONG HIGHWAY TO ANGLIN, THENCE NORTHWEST TO TONASKET.

Cutts ranch, 1.0 mile south of, 20 feet east of road, 50 feet east of small creek, near milepost No. 11; iron post stamped "2183" .....	2, 175. 025
Chewiliken Valley, foot of, at north side of road at beginning of steep grade; top of large boulder marked "2586" .....	2, 578. 25
Chewiliken Valley, 1.0 mile north of Cutts ranch, in root of fir tree 15 feet east of road; nail marked "2687" .....	2, 679. 84
Foster ranch (Chewiliken Valley), 300 feet west of house, 150 feet south of road, in root of 36-inch pine tree; nail marked "3057" .....	3, 049. 82
Talkire Lake, surface of water.....	3, 008
Talkire Lake, 0.5 mile north of, 5 feet east of road; top of stone marked "3147" .....	3, 139. 73
Summit, divide between Chewiliken Valley and Bonaparte Creek, 10 feet east of State road, 500 feet north of small lake; iron post stamped "3216" ..	3, 208. 677
Griggs ranch, 0.5 mile southwest of house, 5 feet east of road, in root of pine tree; nail marked "2522" .....	2, 514. 34
Junction of State road (locally known as the Cutoff road) and main road up Bonaparte Creek, 200 feet north of Bonaparte Creek and 5 feet north of county road; iron post stamped "2116" .....	2, 108. 651
Pasley ranch, 0.8 mile east of house, north side of road, top of stone; tree near marked "U.S.B.M. 2091" .....	2, 083. 92
Pasley ranch, 1.0 mile west of, at mouth of deep canyon, 25 feet south of wagon road; top of large boulder marked "1992" .....	1, 984. 14
Government Indian school, 2.5 miles northeast of, north side of road, road up Antoine Valley 0.25 mile west; top of large stone marked "1482" ....	1, 474. 26
Tonasket post office (Parry's ferry), 300 feet southeast of store, 150 feet northeast of barn, at ferry derrick in west bank of Okanogan River; iron post stamped "904 T" .....	895. 875

## TONASKET ALONG HIGHWAY NORTHEAST TO ANTOINE VALLEY (SPUR LINE).

Antoine Valley, 1.0 mile northeast of Duffy ranch, 0.25 mile north of Government sawmill road, at township corner of Ts. 37 and 38 N., Rs. 27 and 28 E.; iron post stamped "1499 T" .....	Feet. 1,489.574
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## ANGLIN ALONG HIGHWAY NORTHEAST TO VAN BRUNT RANCH.

Junction of State road and road along Bonaparte Creek, 5 feet west of road and 200 feet north of creek; iron post stamped "2116 T" .....	2,108.651
Paterson ranch, 1.5 miles west of, 20 feet south of road, in root of pine tree; nail marked "2283" .....	2,275.84
Best ranch, 0.25 mile west of house, north side of road, at northwest corner of fence; top of stone marked "2335" .....	2,327.95
Best ranch, 1.0 mile east of, 100 feet south of road, near pine tree marked "U.S.G.S.;" top of stone marked "2512" .....	2,504.64
Bingham Flat, east end of, 10 feet north of road; top of stone marked "3272" ..	3,264.14
Lamming store, 100 feet north of, 5 feet north of road crossing Bonaparte Creek, 10 feet south of creek; iron post stamped "3333 T" .....	3,325.936
Van Brunt ranch, 300 feet east of house, in forks of road; iron post stamped "3711 T" .....	3,714.299

## BEST RANCH ALONG HIGHWAY SOUTHEAST TO JOE AENEAS RANCH (SPUR LINE).

Best ranch, 500 feet northeast of house, 30 feet north of road, 20 feet south of creek crossing, near mouth of Aeneas Valley; iron post stamped "2376 T" .....	2,368.232
Kayle ranch, 0.25 mile east of house, at crossroads, about 3.0 miles from mouth of Aeneas Valley; iron post stamped "2541 T" .....	2,533.097
Rupert ranch, 500 feet east of house, 50 feet north of garden fence, in root of pine tree; nail marked "2626" .....	2,618.32
Chief Aeneas ranch, 400 feet south of house, 4 feet east of road, 200 feet southwest of barn; iron post stamped "2625 T" .....	2,617.387
Joe Aeneas ranch, 0.25 mile southeast of, 20 feet north of road, in top of small hill; iron post stamped "2676" .....	2,668.576
Koby ranch, 0.8 mile northwest of, 1,000 feet southeast of bridge over creek, 100 feet east of road; top of stone marked "2455.572" .....	2,448.10

## BEAVER CREEK (HARVEY RANCH) ALONG HIGHWAY NORTHWEST TO CHESAW, THENCE WEST TO OROVILLE.

Fork road to Crystal Butte mine, 100 feet north of; top of large stone marked "3743" .....	3,736.353
Chesaw, 200 feet north of United States customhouse, opposite Morrison Brothers' hotel; iron post stamped "2917 T" .....	2,910.433
Chesaw schoolhouse, southeast corner; top of stone marked "3013" .....	3,006.16
Field ranch, 0.5 mile west of, south side of road; top of boulder marked "3893" .....	3,886.14
He He Rock, 1,000 feet west of, summit between Meyers Creek and Okanogan River, 5 feet west of road; iron post stamped "4091 T" .....	4,084.078
Kipling post office, 100 feet southwest of, 200 feet north of Tonasket Creek, 5 feet south of road; iron post stamped "3698 T" .....	3,691.005
Hawthorn store, 300 feet west of, fork road; iron post stamped "3387 T" ..	3,380.040
McDonald ranch, 0.8 mile east of, 20 feet north of road, 400 feet north of Tonasket Creek; iron post stamped "1959 T" .....	1,951.537
Grayson ranch house, 400 feet east of, north side of road; top of large stone marked "1589" .....	1,582.09
Okanogan River, 1.5 miles east of, in ford of Tonasket Creek; top of stone marked "1117" .....	1,109.85

Oroville, southeast corner of lot at corner of Main and River streets, 200 feet south of Oroville Trading Company's store; iron post stamped "928 T" .....	Feet. 920. 572
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## CHESAW NORTH ALONG HIGHWAY TO CANADIAN BOUNDARY LINE (SPUR LINE).

Chesaw, 0.25 mile north of, west side of road; top of stone marked "2886" ..	2, 878. 59
International boundary line, east side of road, 600 feet west of Meyer's Company; iron post stamped "2631 T" .....	2, 624. 199
Boundary monument No. 75, top of .....	2, 726. 598
Boundary monument No. 75, base of .....	2, 721. 98

## OROVILLE NORTH ALONG HIGHWAY TO CANADIAN BOUNDARY LINE (SPUR LINE).

Osoyoos Lake, at foot; surface of water October 21, 1901.....	911. 6
Okanogan Smith ranch, at fence corner at corner of lane just east of house; top of rock marked "952" .....	944. 53
International boundary line, 0.1 mile east of Osoyoos Lake, 800 feet west of road, 2 feet south of boundary monument No. 89; iron post stamped "1058 T" .....	1, 050. 382

## OROVILLE NORTHWEST ALONG HIGHWAY UP SIMILKAMEEN RIVER 4 MILES.

Similkameen River, 300 feet south of, south side of road, on high bluff; top of rock marked "1097" .....	1, 089. 748
Okanogan Free Gold Mining Camp, 100 feet east of bunk house, 800 feet east of stamp mill; top of large boulder marked "1224" .....	1, 216. 48
Okanogan Free Gold Mining Camp, 1.0 mile northwest of, north side at end of road, 0.5 mile east of Okanogan River, 0.5 mile south of falls; iron post stamped "1415 T" .....	1, 407. 697

## REPUBLIC QUADRANGLE.

## REPUBLIC NORTHEAST ALONG KETTLE FALLS ROAD TO MISSOURI PERKINS RANCH (SPUR LINE).

Republic, 2.5 miles east of, 1,000 feet west of Republic Brewery, 5 feet south of road, at foot of steep grade; iron post stamped "2345 S" .....	2, 348. 207
T. 37 N., R. 34 E., NW. $\frac{1}{4}$ sec. 19, 10 feet southeast of house on Missouri Perkins ranch, 5 feet west of State road; iron post stamped "4113 S" .....	4, 117. 248

## REPUBLIC SOUTH DOWN SANPOIL RIVER ROAD TO ALKIRE (SPUR LINE).

Rabbit Creek, 150 feet north of, on Sanpoil River, 10 feet east of road, 600 feet north of milepost 9; iron post stamped "2142 S" .....	2, 145. 351
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## REPUBLIC WEST ALONG STATE ROAD TO VAN BRUNT RANCH.

Republic, northeast corner of schoolhouse, in stone foundation at base of tower; aluminum tablet stamped "2500 S" .....	2, 503. 137
Welsh sawmill, 1.0 mile west of, 3 feet north of road at point just east of steep grade; iron post stamped "2922 S" .....	2, 925. 189
Limekiln, 1,000 feet east of, 3.0 miles east of Wauconda Mining Camp, 4 feet south of road; iron post stamped "3664 S" .....	3, 667. 221
Van Brunt ranch, 300 feet east of house, at junction of Chesaw stage road and Okanogan State road; iron post stamped "3711 S" .....	3, 714. 299

## REPUBLIC NORTH ALONG COUNTY ROAD TO CURLEW.

Torboy, at west end of lane to Dessertelle ranch, east side of road at junction with Marcus State road; iron post stamped "2411 S" .....	2, 414. 43
Curlew Lake, surface of water at south end of, May 14, 1901.....	2, 345

T. 38 N., R. 33 E., sec. 14, 100 feet south of ford, 5 feet north of road, at St. Peters Creek; iron post stamped "2217 S" .....	Feet. 2, 220. 613
CURLEW LAKE WEST ALONG TROUT CREEK ROAD TO TOWNSHIP CORNER (SPUR LINE).	
T. 38 N., R. 32 E., 5 feet northwest of southeast corner, 400 feet west of house of McCool ranch; iron post stamped "2674 S" .....	2, 677. 079
MOUTH OF ST. PETERS CREEK EAST OVER TRAIL TO FORKS OF ST. PETERS CREEK (SPUR LINE).	
T. 38 N., R. 34 E., 1,000 feet southeast of northwest corner of sec. 19, 0.5 mile east of forks of St. Peters Creek, 1.0 mile west of Olliver ranch, north side of road; iron post stamped "2839 S" .....	2, 842. 272
CURLEW EAST ALONG TRAIL UP LONG ALEX CREEK 2 MILES TO SEMORE RANCH (SPUR LINE).	
Semore ranch, 0.8 mile east of, 100 feet south of Long Alex Creek, 5 feet south of road; iron post stamped "2399 S" .....	2, 402. 696
CURLEW NORTHEAST ALONG COUNTY ROAD TO NELSON (SPUR LINE).	
Curlew, 800 feet south of post office, 100 feet south of Long Alex Creek, south side of road; iron post stamped "1814 S" .....	1, 817. 460
Goosmus Creek, 400 feet north of, 150 feet north of barn, 12 feet east of road; iron post stamped "1768 S" .....	1, 771. 397
UP GOOSMUS CREEK 2 MILES TO LOUIE RANCH (SPUR LINE).	
Manuel Louie ranch, 300 feet north of southeast corner of fence, 10 feet east of fence, 10 feet west of road, about 0.3 mile north of Goosmus Creek; iron post stamped "2616 S" .....	2, 619. 560
CURLEW WEST ALONG KETTLE RIVER ROAD TO MIDWAY, B. C. (SPUR LINE).	
Castello ranch, 2.0 miles west of, opposite mouth of Tonata Creek, 75 feet north of Kettle River, 5 feet north of wagon road; iron post stamped "1828 S" .....	1, 831. 810
T. 40 N., R. 32 E., sec. 27, at Lynch ranch, 0.2 mile east of mouth of Toroda Creek, 100 feet north of Kettle River, 10 feet north of road, 100 feet west of old stone building; iron post stamped "1851 S" .....	1, 854. 314
LYNCH RANCH VIA TORODA CREEK TO VAN BRUNT RANCH.	
Cox ranch, 1.0 mile south of, about 0.6 mile north of Marias Creek, 400 feet west of Toroda Creek, 4 feet west of road; iron post stamped "2228 S" ..	2, 231. 101
Harvey ranch, 1,000 feet south of house, 50 feet south of junction of Chesaw and Toroda roads, 1,000 feet south of mouth of Beaver Creek, west side of road; iron post stamped "2460 S" .....	2, 463. 188
Toroda, 500 feet north of post office, at north end of street, west side of road, 100 feet south of small bridge over creek; iron post stamped "2932 S" ..	2, 935. 818
NEAR REPUBLIC EAST ALONG HIGHWAY TO MILEPOST 11.	
Kaylor, 300 feet west of post office, about sec. 7, T. 36 N., R. 34 E., 150 feet east of milepost 8, on east bank of creek near pole bridge, south side of road; iron post stamped "3496 S" .....	3, 499. 513
Seward station (stage), 1.5 miles east of, 20 feet north of milepost No. 11, in root of fir tree; nail .....	4, 665. 57
MOUTH OF BEAVER CREEK NORTHWEST ALONG ROAD TO CHESAW (PORTION OF LINE).	
Beaver Creek, 1,000 feet south of mouth, 50 feet south of road up Beaver Creek, 1,000 feet south of Harvey ranch, west side of road; iron post stamped "2460 T" .....	2, 463. 188

Pemberton ranch, 1.0 mile west of, north side of road, in root of fir tree; nail; marked "2520".....	Feet. 2, 521. 381
Fish Lake, 5 feet above water surface, road north side.....	2, 557
Summit, 1.5 miles east of, 50 feet west of road, top of large boulder; marked "3401".....	3, 402. 33
Milepost 4, 100 feet west of, 20 feet south of road, in root of large fir tree; nail; marked "3654".....	3, 655. 721
T. 39 N., R. 30 E., southwest corner of sec. 12, 5 feet north of road; iron post stamped "4131 T".....	4, 123. 952

## NESPELEM QUADRANGLE.

ALKIRE VIA TRAIL UP FIRST WEST FORK OF SANPOIL RIVER TO COUNTY LINE (PART OF SPUR LINE).

Alkire, 200 feet east of Alkire Hotel, 150 feet south of store, in corner of fence 5 feet south of road; iron post stamped "1965 S".....	1, 968. 010
Ts. 34 and 35 N., Rs. 31 and 32 E., 0.2 mile south of corner, 150 feet west of Okanogan County boundary line, 20 feet north of trail, in large boulder; aluminum tablet stamped "2295 S".....	2, 298. 328

**Bacon (15'), Chelan (30'), Coulee City (30'), Hicksville (15'), Jameson (30'), Moses Lake (15'), and Wilson Creek (15') quadrangles.**

## CHELAN, DOUGLAS, AND GRANT COUNTIES.

The elevations in the following list were determined by primary leveling extended from the precise-level line of the United States Coast and Geodetic Survey along the Northern Pacific Railway.

The leveling was done as follows: Coulee City and Wilson Creek quadrangles in 1903 by R. A. Farmer; Hicksville and Moses Lake quadrangles in 1903 by R. B. Shaw; Chelan quadrangle in 1898 by E. M. Fry, in 1897 by P. F. Byrne, and in 1903 by Farmer; Moses Jameson quadrangle in 1899 by Fry and in 1903 by Farmer; and Bacon quadrangle in 1903 by Farmer and Shaw and in 1909 by C. H. Semper. During 1910, in cooperation with the State, additional leveling in the Moses Lake quadrangle was done by D. S. Birkett.

## CHELAN QUADRANGLE.

POINT ABOUT 7 MILES NORTH OF WENATCHEE NORTH ALONG ROAD UP WEST SIDE OF COLUMBIA RIVER AND UP KNAPP COULEE TO CHELAN.

T. 24 N., R. 20 E., sec. 26, Swakane Creek, near mouth of, 10 feet west of State road and 10 feet north of road up Swakane Valley; iron post stamped "696 T".....	Feet. 696. 474
O'Connor's Ferry, 100 feet southwest of ferry derrick, top of granite boulder on west side of road.....	706. 2
T. 25 N., R. 21 E., north side of sec. 20, 250 feet northwest of Entiat River bridge, 150 feet northeast of store on north side of road; iron post stamped "696 T".....	696. 707
T. 26 N., R. 21 E., south side of sec. 20, 200 feet northwest of J. T. Fisher house, 6.0 miles southwest of Knapp's ferry, near steam ferry landing; iron post stamped "705 T".....	705. 392
Knapp's Ferry, fractional sec. 12, T. 26 N., R. 21 E., opposite Troy, 35 feet south of warehouse, at south side of granite boulder; iron post stamped "709 T".....	709. 286

Knapp's Coulee, near northwest corner of cornfield, on top of large boulder (5 cubic yards) on stage road.....	Feet. 1, 209. 13
Ts. 26 and 27 N., and Rs. 21 and 22 E., in Knapp's Coulee, 710 feet west of corner; iron post stamped "1370".....	1, 340. 00
Navarre's east fence, about 400 feet east of and about 60 feet south of road, top of large rock 6 feet high and 6 feet in diameter.....	1, 145. 76
Lakeside, about 100 feet from Lake Chelan, set inside of Capt. Johnson's fence; iron post stamped "1121".....	1, 091. 182
Lakeside, water level at wharf 4 p. m., August 13, 1897.....	1, 078
Lake Chelan, near gate 100 feet from, in root of pine tree; wire nail.....	1, 084. 48
Chelan, 125 feet left of road opposite cut bank, Chelan River; on top of boulder.....	1, 207. 99
Lake Chelan, water level on north side, 12.30 p. m., July 31, 1897.....	1, 079
Lakeside, at wharf in front of Lakeview Hotel, water level in Lake Chelan at 3 p. m., June 8, 1899.....	1, 080. 7
Chelan, 0.5 mile west of, 50 feet west of south end of bridge over Chelan River; top of boulder.....	1, 088. 93

COLUMBIA RIVER ALONG HIGHWAY NORTH UP NAVARRE COULEE TO SUMMIT OF RIDGE (SPUR LINE).

T. 27 N., R. 21 E., quarter corner secs. 16 and 21; top of corner stone.....	1, 465. 7
T. 27 N., R. 21 E., sec. 9, 300 yards southwest of log cabin, 40 feet east of road, on a knoll in clump of pine trees at top of ascent on south side of ridge; iron post stamped "1664 T".....	1, 664. 140

COLUMBIA RIVER NORTHWEST ALONG HIGHWAY UP ENTIAT VALLEY (SPUR LINE).

T. 26 N., R. 20 E., sec. 20, 200 feet north of Gray house, in northeast corner of fence 5 feet west of road, in granite boulder; aluminum bolt stamped "1316 T".....	1, 316. 618
T. 27 N., R. 19 E., sec. 2, 100 feet north of log house, 100 feet west of crib, east side of trail up Entiat River, in large granite boulder; aluminum bolt stamped "1680".....	1, 680. 824

COLUMBIA RIVER WEST ALONG HIGHWAY AND TRAIL UP SWAKANE CANYON AND SOUTH DOWN NEHOCKUM CANYON TO MISSION.

T. 24 N., R. 19 E., sec. 11, divide between Swakane and Nehockum canyons, 10 feet west of trail on summit of, in granite boulder; aluminum bolt stamped "3255".....	3, 255. 847
Mission, in front of Great Northern Railway station; top of rail.....	796. 1
Mission, 150 feet southwest of station, 100 feet south of railroad water tank, at corner in center of NW $\frac{1}{4}$ sec. 4, T. 23 N., R. 19 E.; iron post stamped "797 T".....	797. 320

O'CONNOR'S FERRY ALONG HIGHWAY EAST TO WATERVILLE, THENCE NORTH TO KNAPP'S FERRY.

O'Connor's Ferry landing, 400 feet east of, 1.0 mile southwest of Orondo, on north side of road and east bank of Columbia River; iron post stamped "678 T".....	678. 864
T. 25 N., R. 22 E., 42 feet northeast of corner of secs. 29, 30, 31, and 32; iron post stamped "2771 T".....	2, 771. 510
T. 25 N., R. 22 E., corner of secs. 19, 20, 29, and 30, top of stone set for corner to.....	2, 799. 63
Waterville, Douglas County courthouse, in east wall of brick vault on south side of, 2 feet from ground and 2 feet from southeast corner of vault; aluminum tablet stamped "2617 T".....	2, 617. 361



Waterville, Douglas County Bank Building, in front wall of, 2 feet from sidewalk and 2 feet north of entrance door; aluminum tablet stamped "2624 T".....	Feet. 2, 624. 087
T. 26 N., R. 22 E., southeast corner of sec. 28, on front or south side, 1.5 feet from ground and 2 feet from southeast corner of foundation of schoolhouse; aluminum tablet stamped "3004 T".....	3, 004. 853
T. 26 N., R. 22 E., sec. 29, at head of Bunn's Canyon, 250 feet northwest of small house, 10 feet from east side of road; iron post stamped "3055 T"....	3, 054. 933
Troy post office, 1,000 feet southwest of, just opposite warehouse at Knapp's ferry, on left bank of Columbia River; iron post stamped "725 T".....	725. 225

DOBSON RANCH ALONG HIGHWAY BY CIRCUITOUS ROUTE TO SOUTH VIA BADGER MOUNTAIN TO WATERVILLE.

T. 24 N., R. 21 E., sec. 12, Badger Mountain, at junction of roads on summit of; iron post stamped "4145".....	4, 144. 954
T. 25 N., R. 22 E., southeast corner of sec. 33, 150 feet southeast of schoolhouse (district No. 3), on north side of road; iron post stamped "2736 T"....	2, 736. 151

JAMESON QUADRANGLE.

CHELAN NORTH ALONG STATE ROAD TO ALTA LAKE.

Chelan, 3.25 miles north of, 0.25 mile north of Wilson ranch house, 15 feet west of road; iron post stamped "1417 T".....	1, 417. 396
Johnson ranch, northeast corner of, 200 feet west of road and south side of drain; on stone.....	1, 330. 97
Antoine ranch, 1.0 mile south of, 25 feet east of road, 500 feet north of mile-post 48; iron post stamped "1361 T".....	1, 361. 369
Willis ranch, 300 feet south of and 50 feet east of northeast corner of fence, side of road; highest point of stone.....	1, 460. 01
McCarty ranch, 0.5 mile north of, 100 feet east of State road, on highest point of stone set for quarter corner of township line.....	1, 425. 27

POINT NEAR BAIRD WEST ALONG HIGHWAY TO WATERVILLE.

T. 25 N., R. 26 E., 15 feet south of standard section corner to secs. 35 and 36, Baird, 2.5 miles west of; iron post stamped "2441 T".....	2, 441. 381
T. 25 N., R. 26 E., corner of secs. 27, 28, 33, and 34, 520 feet south of, 20 feet north of road, near telephone pole 533; iron post stamped "2386 T"....	2, 386. 957
Telephone pole 641, 4 feet west of; iron post stamped "2185 T".....	2, 185. 559
White Sulphur Springs, 400 feet north of; top of large rock marked with circle of paint; marked "1951".....	1, 951. 540
White Sulphur Springs, 0.25 mile west of, 10 feet north of road; iron post stamped "1883 T".....	1, 883. 797
Moses Coulee, at bottom of, west side of, 6 feet west of telephone pole; iron post stamped "1670 T".....	1, 670. 480
"Dewey" triangulation station, top of bronze tablet stamped "2609 T"....	2, 609. 035
Farmer, 2.5 miles east of, 8 feet west of telephone pole 915; iron post stamped "2539 T".....	2, 539. 822
Farmer, 1.0 mile west of, 5 feet east of telephone pole 1033; iron post stamped "2371 T".....	2, 370. 887
Telephone pole 1144, 4 feet east of; iron post stamped "2505 T".....	2, 505. 673
Telephone pole 1241, 6 feet east of; iron post stamped "2472 T".....	2, 472. 339
Douglas, 0.5 mile north of, 10 feet north of telephone pole 1336; iron post stamped "2509 T".....	2, 509. 232

## CHELAN SOUTHEAST TO CHELAN FALLS (SPUR LINE).

Coulee, at north end of, 48 feet east from pine tree 15 inches in diameter near rock slide; top of rock 2 by 5 by 2 feet.....	Feet. 1, 179. 40
Chelan River, near large rock bluff near head and left of gulch opening into; top of rock.....	996. 0
Chelan Falls, at southwest corner of intersection of Chelan Avenue and First Street, near northeast corner of hotel; iron post stamped "764"...	733. 702

## COULEE CITY QUADRANGLE.

## SPRAGUE WATER TANK NORTH ALONG NORTHERN PACIFIC RAILWAY TO COULEE CITY, THENCE WEST ALONG HIGHWAY TO POINT NEAR BAIRD.

Milepost 8, 250 feet north of, west of track; iron post stamped "1522 T"...	1, 522. 932
Milepost 7, 4 feet east of; top of iron peg 4 feet long in ground, marked "1552".....	1, 522. 27
Milepost 5, 1,200 feet south of, 20 feet east of track; iron post stamped "1647 T".....	1, 647. 386
Coulee City, 2.0 miles east of, 350 feet north of milepost 2, 200 feet northwest of railroad crossing; iron post stamped "1711 T".....	1, 711. 857
Coulee City, southeast corner of station, 4 feet east of; iron post stamped "1584 T".....	1, 584. 089
Coulee City, 3.1 miles west of, 8 feet north of telephone pole 109, south of road; iron post stamped "1602 T".....	1, 602. 292
Coulee City, 6.0 miles west of, 10 feet north of telephone pole 211; iron post stamped "2240 T".....	2, 240. 821
T. 25 N., R. 27 E., 20 feet south of standard corner to secs. 32 and 33, Baird, 1.0 mile east of; iron post stamped "2452 T".....	2, 452. 612

## ELMIRA WEST ALONG NORTHERN PACIFIC RAILWAY TO COULEE CITY.

Hartline, on Northern Pacific Railway, east of station; iron post stamped "1911 T".....	1, 911. 443
Hartline, 5.25 miles west of, at milepost 102; iron post stamped "1821 T".....	1, 820. 510

## BACON QUADRANGLE.

## MOSES LAKE WEST ALONG HIGHWAY TO EPHRATA.

Moses Lake, 2.9 miles north of, 10 feet west of road, in granite outcrops; tablet stamped "1089 T".....	1, 088. 949
Moses Lake, 6.0 miles north of, 8 feet southwest of road, in 2 by 2 foot bowl-der 1 foot above ground; tablet stamped "1274 T".....	1, 273. 949

## POINT 4 MILES SOUTHEAST OF EPHRATA SOUTHEAST AND NORTH ALONG HIGHWAY TO GREAT NORTHERN RAILWAY (PORTION OF LINE).

Ephrata, 6.0 miles south of, on road down east side of Moses Lake, west margin of road; top of large rock marked "U. S. $\square$ B. M. 1130".....	1, 129. 90
T. 21 N., R. 27 E., southwest corner of sec. 33, Ephrata, 7.0 miles south of; iron post stamped "1066".....	1, 066. 375
Gibbons ranch, 1.0 mile north of, on west margin of road; top of rock marked "U. S. $\square$ B. M. 1069".....	1, 069. 13
Crab Creek, Joe Ogen ranch, about 800 feet northwest of house, at corner of wire fence; iron post stamped "1071".....	1, 070. 743
Crab Creek, at angle in road, opposite ranch house and sheep pens, west side of road; top of large rock marked "U. S. $\square$ B. M. 1079".....	1, 079. 68
Crab Creek, 1.6 miles south of railroad, on east side of road, top of large rock marked "U. S. $\square$ B. M. 1124".....	1, 124. 05
Milepost 1596, 4 feet east of; iron post stamped "1251 T".....	1, 251. 724

## ADRIAN SOUTH ALONG HIGHWAY TOWARD MOSES LAKE (SPUR LINE).

	Feet.
Milepost 1590, 4 feet east of; iron post stamped "1188 T".....	1, 188. 334
Adrian, 2.8 miles south of, at Cowell ranch house, 30 feet south of house, at corner of chicken yard; iron post stamped "1210".....	1, 210. 278
Adrian, 3.6 miles south of, in small coulee at north end, west side; top of rock marked "U. S. □ B. M. 1173".....	1, 174. 18
Adrian, 4.7 miles south of, 1,200 feet south of G. M. Walher house, 100 feet north of wire fence; top of outcrop marked "U. S. B. M. 1165".....	1, 164. 81

## POINT NEAR EPHREATA NORTHEAST ALONG GREAT NORTHERN RAILWAY TO ADRIAN.

Milepost 1596, 4 feet east of; iron post stamped "1251 T".....	1, 251. 724
Milepost 1593, 4 feet east of; iron post stamped "1233 T".....	1, 233. 050
Milepost 1590, 4 feet east of; iron post stamped "1188 T".....	1, 188. 334

## ADRIAN EAST ALONG GREAT NORTHERN RAILWAY TO POINT NEAR WILSON CREEK (SPUR LINE).

Milepost 1587, 4 feet east of; iron post stamped "1252 T".....	1, 252. 238
Stratford, 5 feet west of milepost 1584; iron post stamped "1277 T".....	1, 277. 253
Milepost 1581, 150 feet north of; iron post stamped "1259 T".....	1, 259. 855
Wilson Creek Wash, 2.0 miles west of, at road crossing, 8 feet east of sign- board; iron post stamped "1272 T".....	1, 272. 870

## ADRIAN NORTH ALONG NORTHERN PACIFIC RAILWAY TO COULEE CITY (PORTION OF LINE).

Milepost 18, 12 feet north of, 20 feet west of track; iron post stamped "1351 T".....	1, 351. 995
Milepost 15, 100 feet north of, east of track; iron post stamped "1489 T".....	1, 489. 564
Sunbath, 400 feet south of section house, 30 feet west of track; iron post stamped "1522 T".....	1, 522. 711

## WILSON CREEK QUADRANGLE.

ADRIAN EAST ALONG GREAT NORTHERN RAILWAY TO POINT NEAR WILSON CREEK (PORTION OF  
SPUR LINE).

Milepost 1581, 150 feet north of; iron post stamped "1259 T".....	1, 259. 855
Wilson Creek Wash, 2.0 miles west of, at road crossing, 8 feet east of sign- board; iron post stamped "1272 T".....	1, 272. 870

## HICKSVILLE QUADRANGLE.

## LIND WEST ALONG ROAD AND TRAIL TO MOSES LAKE (PORTION OF LINE).

T. 18 N., R. 30 E., 750 feet east of center of sec. 20, 27.1 miles west of Lind; 75 feet west of old trail; iron post stamped "1153 T".....	1, 152. 836
T. 18 N., R. 29 E., in SW. $\frac{1}{4}$ sec. 13, 8 feet north of old McMoman trail, on summit of very small ridge running north and south, 30 miles west of Lind; iron post stamped "1157 T".....	1, 156. 875
Lind; 33 miles west of, 20 feet west of road, 100 feet north of forks in road, 600 feet east of north of small shanty; iron post stamped "1225 T".....	1, 224. 694
T. 19 N., R. 29 E., northwest corner of sec. 20, 39.3 miles west of Lind, 7 feet north of road; iron post stamped "1189 T".....	1, 188. 569

## MOSES LAKE QUADRANGLE.

## LIND WEST ALONG ROAD AND TRAIL TO MOSES LAKE (PORTION OF LINE).

T. 19 N., R. 28 E., in sec. 24, 42.6 miles northwest of Lind, east edge of Moses Lake, 300 feet northwest along east side of lake, in 6-foot by 8-inch rock 2 feet above ground; tablet stamped "1049 T".....	1, 048. 678
Moses Lake, surface of water, September 28, 1903.....	1, 045. 9

## MOSES LAKE, BENCH MARKS IN VICINITY ESTABLISHED FROM WATER SURFACE.

Moses Lake, at foot of, 50 feet east of edge of, 40 feet south of dim road, in 2 by 4 foot rock, 1 foot out of ground; tablet stamped "1070 T" .....	Feet. 1, 069. 702
Moses Lake, east side of, in T. 20 N., R. 28 E., a trifle east of triangulation station Lewis, in large loose boulder by water's edge; tablet stamped "1049 T" .....	1, 049. 283

## MOSES LAKE NORTHWEST ALONG HIGHWAY TO EPHRATA.

Moses Lake, 15 feet west of, across head of lake from very old haystack, in large flat-topped boulder (granite) 6 by 8 by 3 feet high; tablet stamped "1049 T" .....	1, 049. 081
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## POINT 3 MILES NORTH OF NORTH END OF MOSES LAKE SOUTH ALONG ROAD WEST OF LAKE TO MAE, THENCE WEST TO POINT 2 MILES SOUTH OF MORRISON.

T. 21 N., R. 27 E., 0.1 mile west of north-south line between secs. 32 and 33, on township line and south line of sec. 32, 7 miles south of Ephrata; iron post stamped "1066" .....	1, 066. 375
Moses Lake, 2.9 miles north of, 10 feet west of road, in granite outcrop; aluminum tablet stamped "1089 T" .....	1, 088. 949
Drumhiller ranch, 0.8 mile south of, 0.3 mile west of Crab Creek, 45 feet east of road and 30 feet west of north-south fence; point on basalt boulder marked "U. S. 1065.6 B. M." .....	1, 065. 55
Moses Lake, 1.5 miles north by 0.5 mile west of head of, 2 miles south of Drumhiller ranch house, 1.3 miles north of J. Sargent ranch house, 175 feet east of road, 175 feet south of fence corner, in granite boulder 4 by 4½ by 4 feet; aluminum tablet stamped "1092 WASH" .....	1, 092. 394
Moses Lake, 0.25 mile west of, intersection of roads on bench, 500 feet south of, on east fork and 0.6 mile south of head of lake; point on basalt boulder 2½ by 1½ by 1½ feet, marked "U. S. 1117 B. M." .....	1, 117. 32
Moses Lake, 1.3 miles south of head of, at top edge of mesa, 200 feet west of lake and 119 feet above present surface of lake, near section line between secs. 33 and 34, T. 20 N., R. 27 E., 15 feet east of road; iron post stamped "1157 WASH" .....	1, 157. 201
Moses Lake, 1.3 miles south of head of, 35 feet west of road, on west side of lake, at top of hill; point on basalt boulder marked "U. S. 1154.7 B. M." .....	1, 154. 62
Mae, 2 miles north of, 4.2 miles south of head of Moses Lake, 1.3 miles east of lake and 0.6 mile northwest of pink-colored schoolhouse (West Shore school), 15 feet east of road; point on basalt boulder marked "U. S. 1101 B. M." .....	1, 101. 04
West Shore schoolhouse, northeast corner of sec. 14, T. 19 N., R. 27 E., in northeast corner of school yard; iron post stamped "1107 WASH" .....	1, 106. 831
Mae, 3.2 miles west of, 5 feet north of road, on edge of bench 1,000 feet east of Maxwell's pumping plant; point on low-lying basalt boulder 2 by 1 foot, marked "U. S. 1091 B. M." .....	1, 090. 41
T. 19 N., R. 27 E., 250 feet west of quarter section corner between secs. 20 and 29, 3.4 miles west of Mae, 50 feet east of Maxwell's pumping plant, north side of road, 33 feet north of section line, in low-lying basalt boulder 2 by 1½ feet; aluminum tablet stamped "1075 WASH" .....	1, 075. 242
T. 19 N., R. 27 E., southwest corner of sec. 18; iron post stamped "1235 WASH" .....	1, 234. 803
T. 19 N., R. 28 E., northwest corner of sec. 22, 2 miles south by 0.5 mile east of Morrison; iron post stamped "1226 WASH" .....	1, 226. 090

## MAE POST OFFICE EAST ALONG HIGHWAYS TO MOSES LAKE.

T. 19 N., R. 27 E., northeast corner of sec. 26, 1,225 feet east of Mae; iron post stamped "1067 WASH".....	Feet. 1,066.480
T. 19 N., R. 27 E., 0.8 mile east of southeast corner of sec. 24, 70 feet west of Moses Lake, on bench 20 feet above water, 30 feet west of edge of bench, end of road leading east to lake, 80 feet east of point where east road intersects north-south road; iron post stamped "1058 WASH".....	1,058.330
Moses Lake, surface of water, August 3, 1910.....	1,038.04

## MAE SOUTH VIA SOUTH END OF MOSES LAKE TO SEC. 28, T. 18 N., R. 26 E.

T. 18 N., R. 28 E., NE. $\frac{1}{4}$ sec. 6, about 200 feet east of southwest corner of NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 6 (40-acre corner), 150 feet west of James Lee ranch house, in line of fences at fence corner; iron post stamped "1040 WASH".....	1,039.475
T. 18 N., R. 27 E., on south line of NE. $\frac{1}{4}$ sec. 14, about 1,400 feet east of southwest corner of that quarter, 20 feet east of edge of mesa, 100 feet north of dim road which turns down hill and leads to southwest, 0.4 mile northwest of most northerly of potholes containing water; iron post stamped "1107 WASH".....	1,107.052
T. 18 N., R. 27 E., near northwest corner of sec. 26, 15 feet east of dim road, spike in knuckle at base of lone willow tree 14 inches in diameter, marked "U. S. 1031 B. M.".....	1,030.42
T. 18 N., R. 27 E., NW. $\frac{1}{4}$ sec. 28, on little knoll, edge of bench which rises abruptly 35 feet overlooking sand dunes on lowland to east, 2 miles west of lone willow tree 14 inches in diameter alongside of dim north-south road, witnessed by willow pole 8 feet high with flag; iron post stamped "1077 WASH".....	1,076.615
T. 18 N., R. 27 E., in NW. $\frac{1}{4}$ sec. 30, about middle of mesa east-west, 400 feet south of long east-west sand ridge 15 feet high, point on top of granite boulder 3 by 5 by 3 $\frac{1}{2}$ feet, witnessed by willow pole 6 feet high with flag.....	1,161.30
T. 18 N., R. 26 E., southeast corner of sec. 28; 20 feet west of road; iron post stamped "1142 WASH".....	1,142.428

POINT 1 MILE WEST OF OUTLET OF MOSES LAKE (CRAB CREEK), SEC. 6, T. 18 N., R. 27 E., SOUTH-EAST AROUND SOUTH END OF MOSES LAKE, THENCE SOUTHEAST TO TOWNSHIP LINE (SEC. 35, T. 18 N., R. 28 E.), THENCE NORTHEAST TO SOUTHEAST CORNER OF SEC. 1, T. 18 N., R. 28 E. (UNCHECKED SPUR LINE).

Moses Lake, surface of water, August 5, 1910.....	1,038.05
Moses Lake, south end of, 400 feet north of, 20 feet south of dim road, east side of lake on top of bench, in basalt boulder 2 feet long; aluminum tablet stamped "1070 T".....	1,069.702
Moses Lake, 2.6 miles south-southeast of, edge of mesa about 100 feet above old lake bed, 18 feet east of edge of bench, south of most southerly of sand dunes on mesa; iron post stamped "1104 WASH".....	1,103.901
T. 18 N., R. 28 E., southeast corner of sec. 35; iron post stamped "1080 WASH".....	1,079.811
T. 18 N., R. 28 E., southeast corner of sec. 13; iron post stamped "1139 WASH".....	1,138.670

## NORTH END OF MOSES LAKE TO M'CONHIE'S RANCH (CHECKED SPUR LINE).

Moses Lake, surface of water, August 15, 1910.....	1,037.91
Moses Lake, 1.25 miles south of head of, in NE. $\frac{1}{4}$ sec. 34, near southwest corner T. 20 N., R. 27 E., 400 feet east of lake on edge of first bench, 100 feet north of McConhie's irrigation project headquarters, in granite boulder; aluminum tablet stamped "1072 WASH".....	1,072.010

Beverly, Ephrata, Malaga, Palisades, Quincy, Redrock, Wenatchee, Winchester 16', and Yakima Quadrangles, and Two Unnamed Quadrangles South of Malaga and Wenatchee Quadrangles.

CHELAN, DOUGLAS, GRANT, AND KITTITAS COUNTIES.

The elevations in the following list were determined by primary leveling extended from the Coast and Geodetic Survey precise-level line at and near Ellensburg. Additional bench marks in this area established by the Reclamation Service are also included in this list.

The leveling was done as follows: Wenatchee quadrangle in 1898 by E. M. Fry, in 1903 by R. A. Farmer, and in 1909 by C. H. Semper; Palisades quadrangle and quadrangle south of Malaga quadrangle in 1903 by Farmer; Ephrata, Malaga, Winchester, and Quincy quadrangles by Farmer and Semper in 1903 and 1909, respectively; and Beverly, Redrock, and Yakima quadrangles and quadrangle south of Wenatchee quadrangle in 1909 by Semper.

The work of 1909 was done in cooperation with the State, and the standard bench marks then established are stamped with the State name.

EPHRATA QUADRANGLE.

WINCHESTER NORTHEAST ALONG GREAT NORTHERN RAILWAY TO MILEPOST 1598.

	Feet.
Milepost 1605, 200 feet east of, in base of west post of emergency rail support, south of track; spike.....	1, 319. 78
Milepost 1603, 1,100 feet east of, 30 feet north of track, in top of boulder; aluminum tablet stamped "1261 T".....	1, 261. 785
Milepost 1601, top of stake at foot of (railroad engineers' bench mark).....	1, 246. 41
Ephrata, southwest corner of Mercantile Co.'s store, 6 feet west of; iron post stamped "1273 T".....	1, 272. 465

POINT 5 MILES NORTHWEST OF MOSES LAKE NORTHWEST ALONG HIGHWAY TO EPHRATA.

Moses Lake, 6.0 miles north of, 8 feet southwest of road, in 2 by 2 foot boulder 1 foot above ground; aluminum (?) tablet stamped "1274 T" (reported broken off, only the stem left).....	1, 273. 949
Moses Lake, 6.0 miles north of, 4 miles south of Ephrata, 1,080 feet north of fork in road, 30 feet east of road, at telephone pole, iron post stamped "1275".....	1, 275. 297

EPHRATA SOUTH ALONG ROAD 5 MILES.

Ephrata, 3.7 miles south of, at curve in road to south, about halfway uphill, 5 feet east of road, in top of large granite boulder; aluminum tablet stamped "?".....	1, 282. 852
Ephrata, 4.9 miles south of, on west margin of road, on large rock; marked "U. S. □ B. M. 1270".....	1, 270. 28

PALISADES QUADRANGLE.

TRINIDAD NORTHEAST AND SOUTHEAST ALONG NORTHERN PACIFIC RAILWAY TO CRATER.

Willow Springs, southeast corner of water tank, in foundation; aluminum tablet stamped "1114 T".....	1, 114. 183
Crater, 0.5 mile south of, opposite milepost 1620, 10 feet east of track; iron post stamped "1242 T".....	1, 242. 400

## WINCHESTER QUADRANGLE.

## MILEPOST 1612 EAST ALONG NORTHERN PACIFIC RAILWAY TO WINCHESTER.

Winchester, 1.5 miles west of, 5 feet east of milepost 1611; iron post stamped "1291 T" .....	Feet. 1, 291. 457
Winchester, 20 feet south of track, opposite section house, in top of granite boulder; aluminum tablet stamped "1277 T" .....	1, 277. 083

## POINT 5 MILES SOUTH OF EPHRATA SOUTH ALONG HIGHWAY TO MORRISON, THENCE WEST 3 MILES, THENCE NORTHWEST TO WINCHESTER.

Ephrata, 6.3 miles south of, 30 feet east of road, 500 feet north of road to east, on top of large boulder; marked "U. S. □ B. M. 1241" .....	1, 241. 08
T. 20 N., R. 26 E., northwest corner of sec. 22; iron post .....	1, 243. 492
T. 20 N., R. 26 E., southwest corner of sec. 34; iron post .....	1, 246. 447
T. 19 N., R. 26 E., southwest corner of sec. 6; iron post .....	1, 215. 136
T. 20 N., R. 25 E., southwest corner of sec. 26; iron post .....	1, 214. 217
T. 20 N., R. 25 E., west quarter corner of sec. 22; iron post .....	1, 215. 811
Winchester, 20 feet south of track, opposite section house, in top of granite boulder; aluminum tablet stamped "1277" .....	1, 277. 083

## POINT 3 MILES WEST OF MORRISON WEST ALONG HIGHWAY 6 MILES.

T. 19 N., R. 25 E., northwest corner of sec. 11, in corner fence post; spike marked "1156" .....	1, 156. 23
T. 19 N., R. 25 E., northwest corner of sec. 10; iron post .....	1, 212. 616
T. 19 N., R. 25 E., northwest corner of sec. 7; iron post .....	1, 201. 601

## MORRISON SOUTH ALONG HIGHWAY 3 MILES, THENCE WEST 5 MILES, THENCE SOUTH 2 MILES AND WEST TO SOUTHWEST CORNER OF T. 19 N., R. 25 E.

T. 19 N., R. 26 E., northwest corner of sec. 22; iron post .....	1, 226. 090
T. 19 N., R. 26 E., northwest corner of sec. 30; iron post .....	1, 160. 667
T. 19 N., R. 25 E., northeast corner of sec. 34; iron post .....	1, 184. 534
T. 19 N., R. 26 E., northwest corner of sec. 30; iron post .....	1, 160. 667
T. 19 N., R. 25 E., northeast corner of sec. 34; iron post .....	1, 184. 534
T. 19 N., R. 25 E., southeast corner of sec. 32; iron post stamped (?) .....	1, 166. 395
T. 19 N., R. 25 E., southwest corner of sec. 31; iron post stamped "1185 T" .....	1, 185. 437

## POINT 3 MILES SOUTH OF MORRISON SOUTH ALONG HIGHWAY 8 MILES.

T. 19 N., R. 26 E., southwest corner of sec. 34; iron post .....	1, 147. 967
T. 18 N., R. 26 E., northwest corner of sec. 22; iron post .....	1, 133. 990
T. 18 N., R. 26 E., near southeast corner of sec. 28, 20 feet west of road, on top of small hill; iron post .....	1, 142. 428

RECLAMATION SERVICE BENCH MARK.<sup>1</sup>

Tps. 19 and 20 N., Rs. 24 and 25 E., at corner; iron post stamped "1206 T" ..	1, 206. 494
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## QUINCY QUADRANGLE.

## CRATER EAST ALONG NORTHERN PACIFIC RAILWAY TO MILEPOST 1612.

Milepost 1617, 5 feet east of; iron post stamped "1316 T" .....	1, 316. 708
Quincy station, opposite west end of station platform, south of track; iron post stamped "1301 T" .....	1, 301. 292

## QUINCY SOUTH AND EAST ALONG HIGHWAY TOWARD MORRISON.

Quincy, 1.3 miles west of, 5 feet east of milepost 1617; iron post stamped "1316 T" .....	1, 316. 708
Quincy, at southeast corner of Bank of Douglas County; iron post .....	1, 301. 662

<sup>1</sup>Leveling done in 1904 by Philo Holbrook, Jr.

Quincy, 5.0 miles south of, southeast corner of sec. 31, T. 20 N., R. 24 E.;	Feet.
iron post.....	1,259.589
T. 19 N., R. 24 E., northwest corner of sec. 10; iron post.....	1,236.026
POINT 6 MILES SOUTH OF QUINCY SOUTH ALONG HIGHWAY $\frac{1}{2}$ MILES, THENCE EAST TO SOUTHWEST CORNER OF T. 19 N., R. 25 E.	
T. 19 N., R. 24 E., northwest corner of sec. 20; iron post stamped "1236"....	1,236.027
T. 19 N., R. 24 E., southwest corner of sec. 32; iron post.....	1,212.867
T. 19 N., R. 24 E., southwest corner of sec. 35; iron post stamped "1219"....	1,219.325
SOUTHWEST CORNER OF SEC. 32, T. 19 N., R. 24 E., SOUTH ALONG HIGHWAY 6 MILES, THENCE EAST 2 MILES.	
T. 18 N., R. 24 E., southeast corner of sec. 18; iron post.....	1,208.781
T. 18 N., R. 24 E., southwest corner of sec. 32; iron post.....	1,323.319

## REDROCK QUADRANGLE.

POINT 12 MILES SOUTH OF MORRISON WEST ALONG HIGHWAY 9 MILES.

T. 17 N., R. 26 E., southeast corner of sec. 4; iron post.....	1,120.735
T. 17 N., R. 25 E., southeast corner of sec. 1; iron post.....	1,132.413
T. 17 N., R. 25 E., northwest corner of sec. 10; iron pos.....	1,165.613
T. 17 N., R. 25 E., southwest corner of sec. 6; iron post.....	1,209.38
T. 17 N., R. 25 E., SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 7 (old bench mark not connected).....	1,239.253

POINT 12 MILES SOUTH OF MORRISON SOUTH ALONG HIGHWAYS 4.5 MILES, THENCE WEST TO SEC. 26, T. 17 N., R. 24 E.

T. 17 N., R. 26 E., southeast corner of sec. 4; iron post.....	1,120.735
T. 17 N., R. 26 E., at center of quarter corners in sec. 22; iron post stamped "1279".....	1,278.889
T. 17 N., R. 26 E., southeast corner of sec. 30; iron post stamped "1055"....	1,055.244
T. 17 N., R. 25 E., northeast corner of sec. 34; iron post stamped "1115"....	1,114.830
T. 17 N., R. 25 E., southeast corner of sec. 30; iron post stamped "1174"....	1,174.303

NORTHWEST CORNER OF SEC. 31, T. 17 N., R. 26 E., SOUTH ALONG HIGHWAY TO REDROCK.

T. 16 N., R. 26 E., northeast corner of NW. $\frac{1}{4}$ sec. 6; iron post stamped "1024".....	1,023.583
T. 16 N., R. 26 E., northwest corner of sec. 20; iron post stamped "666"....	666.08
Redrock, bridge over Crab Creek, south end, east side, in guard rail; marked "U. S. $\square$ B. M. 540"; spike.....	540.41

POINT 1.7 MILES EAST OF COLLETTA WEST ALONG CHICAGO, MILWAUKEE &amp; PUGET SOUND RAILWAY TO JERICHO.

Colletta, 1.7 miles east of, at east end of long rock side cut, 15 feet south of track; iron post stamped "667".....	666.728
Colletta, 0.6 mile east of, 6 feet north of track, opposite large hill of scab rock, on top of boulder; marked "U. S. $\square$ B. M. 643".....	642.81
Colletta, in front of station sign; top of rail.....	629.4
Redrock, on Chicago, Milwaukee & Puget Sound Railway, south of wagon bridge over Crab Creek, 300 feet east of, 35 feet north of track, at telegraph pole; iron post stamped "598".....	598.035
Smyrna, in front of station sign; top of rail.....	552.5
Smyrna, 1.1 miles west of, in sec. 28, T. 16 N., R. 25 E., 150 feet east of J. W. Hare house, 35 feet north of track; iron post stamped "536".....	536.406
Smyrna, 3.4 miles west of, at west end of trestle over Crab Creek, top of bolt in north guard rail; marked "U. S. $\square$ B. M. 528".....	528.29
Smyrna, 4.6 miles west of, 1.0 mile east of Jericho, 30 feet north of track, 7 feet west of telegraph pole; iron post stamped "522".....	521.995
Jericho, in front of station sign; top of rail.....	525.8



## SMYRNA SOUTHWEST ALONG HIGHWAY TO TOP OF SADDLE MOUNTAIN (CHECKED SPUR).

Top of Saddle Mountain; iron post (on horse trail that leads up mountain from Smyrna, about 3 miles) . . . . .	Feet. 2, 431. 350
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RECLAMATION SERVICE BENCH MARK.<sup>1</sup>

T. 17 N., R. 25 E., SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ , sec. 7, near range line on north slope of French Mountain; iron post stamped "1239 T" . . . . .	1, 239. 253
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## BEVERLY QUADRANGLE.

## SOUTHWEST CORNER OF SEC. 32, T. 18 N., R. 24 E., SOUTH ALONG HIGHWAY TO BEVERLY.

T. 18 N., R. 24 E., southwest corner of sec. 32; iron post . . . . .	1, 323. 319
T. 17 N., R. 24 E., northwest corner of sec. 20; iron post . . . . .	1, 326. 384
T. 17 N., R. 24 E., southwest corner of sec. 32; iron post . . . . .	1, 071. 883
T. 16 N., R. 24 E., center east side of SW. $\frac{1}{4}$ sec. 6; in fence post; spike; marked "1210" . . . . .	1, 210. 59
T. 16 N., R. 24 E., northwest corner of sec. 18; iron post . . . . .	1, 174. 523

## SOUTHWEST CORNER OF SEC. 34, T. 18 N., R. 24 E., SOUTH AND EAST ALONG HIGHWAY TO LOW GAP, THENCE SOUTH AND WEST TO NORTHWEST CORNER OF SEC. 22, T. 17 N., R. 24 E.

T. 17 N., R. 24 E., southwest corner of sec. 2; iron post . . . . .	1, 274. 170
T. 17 N., R. 25 E., southwest corner of sec. 6; iron post stamped "1209" . . . . .	1, 209. 380
T. 17 N., R. 24 E., southwest corner of sec. 24; iron post stamped "1170" . . . . .	1, 169. 652
T. 17 N., R. 24 E., southeast corner of sec. 28; iron post stamped "1076" . . . . .	1, 075. 990

## JERICHO WEST ALONG CHICAGO, MILWAUKEE &amp; PUGET SOUND RAILWAY TO COHASSETT.

Jericho, 460 feet west of station sign, 8 feet north of track, in rock cut, top of rock; marked "U. S. $\square$ B. M. 527" . . . . .	527. 11
Jericho, 2.0 miles west of, 170 feet west and north of cabin, 10 feet north of track; iron post stamped "528" . . . . .	528. 304
Beverly, at Chicago, Milwaukee & Puget Sound Railway station, 20 feet west of water tank, 12 feet south of main track; iron post . . . . .	546. 490
Beverly, at extreme west end of railroad trestle over Columbia River, top of bent, south side of track; railroad spike marked "561" . . . . .	561. 51
Cohasset, 300 feet east of west end of sidetrack, 30 feet south of track; iron post . . . . .	769. 817

## WENATCHEE QUADRANGLE.

## POINT NEAR MISSION SOUTHEAST ALONG GREAT NORTHERN RAILWAY TO MALAGA.

Wenatchee, 100 feet west of station, 150 feet east of water tank; iron post stamped "639 T" . . . . .	639. 485
Wenatchee, Columbia River Bank Building, front of, 2 feet above sidewalk, 8 feet north of entrance door; aluminum tablet stamped "669 T" . . . . .	669. 589
Wenatchee, 3.0 miles east of, 300 feet east of milepost 1648, north of road crossing, at corner of fence; iron post stamped "649 T" . . . . .	649. 319

## WENATCHEE NORTH ALONG STATE ROAD UP COLUMBIA RIVER TO MILEPOST 7.

Milepost 7, about 0.2 mile south of, 1,000 feet northwest of old lime works on west side of road; iron post stamped "738 T" . . . . .	738. 090
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## POINT IN T. 22 N., R. 20 E., NORTH TO MALAGA.

Summit, 12.9 miles north of, 0.4 mile south of Boland ranch, on east margin of road, on large rock; marked "U. S. $\square$ B. M. 789" . . . . .	789. 40
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<sup>1</sup> Leveling done in 1904 by Philo Holbrook.

Summit, 13.7 miles north of, on road to Ellensburg, at corner of wire fence in front of W. R. Prowell ranch house; iron post stamped "783" .....	Feet. 783. 112
Malaga, 3.6 miles southeast of, on road to Ellensburg, east side of road, on large rock; marked "□ 790" .....	789. 62
Malaga, 2.4 miles southeast of, at gateway leading to G. G. Hager ranch house; iron post stamped "805" .....	805. 225

## WENATCHEE EAST ALONG HIGHWAY 3 MILES.

Center of bridge over Wenatchee River .....	690. 3
Wenatchee, 1.2 miles east of, 800 feet northeast of east end of bridge over river, on road to north, on west side of large rock; top of rock marked "U. S. □ B. M. 678" .....	678. 59
Wenatchee, 2.5 miles northeast of, at northwest corner of H. J. Betty ranch (road turns east up canyon); iron post stamped "965" .....	965. 900

## QUADRANGLE SOUTH OF WENATCHEE QUADRANGLE.

POINT NEAR SOUTHWEST CORNER OF T. 18 N., R. 20 E., NORTH ALONG HIGHWAY TOWARD MALAGA.

Ellensburg, 12.7 miles northeast of, at crossroads, at northwest corner of R. B. Gage ranch; iron post stamped "2310" .....	2, 309. 800
Ellensburg, 16.0 miles northeast of, 3.2 miles north of R. B. Gage ranch house, 15 feet east of road, opposite wire fence corner; iron post stamped "3173" .....	3, 172. 545
Ellensburg, 19.0 miles northeast of, 0.4 mile north of first summit of mountain, 10 feet east of wire fence, 10 feet west of road; iron post stamped "4770" .....	4, 770. 205
Ellensburg, 22.3 miles northeast of, on top of mountain, 80 feet west of wire fence, 30 feet east of road; iron post stamped "5134" .....	5, 133. 824
Ellensburg, 23.6 miles northeast of, at summit of mountain, 10 feet west of road, in root of pine tree; spike marked "U. S. B. M. 5373" (tree 5 feet south of b. m. bears sign "Cable Ferry 13 miles") .....	5, 372. 75
Summit, 2.3 miles north of, in small grass draw, 30 feet west of road, 45 feet south of small clump of poplar brush; iron post stamped "4789" .....	4, 788. 555
Summit, 3.3 miles north of, on east side of road, in rocky clearing, top of rock; marked "U. S. □ B. M. 4213" .....	4, 213. 15
Top of loose stone monument, probably triangulation station .....	4, 177.
Summit, 4.6 miles north of, in canyon, at foot of steep grade (cut bank), south margin of road; iron post stamped "3443" .....	3, 442. 647
Summit, 5.6 miles north of, at foot of mountain where grain fields commence, large pine stump in center of road, in root of; spike marked "U. S. B. M. 2953" .....	2, 953. 49
Summit, 7.4 miles north of, on Colocham Creek, in front of W. A. Haley ranch house, east side of road, large rock marked "U. S. □ B. M. 1882" ..	1, 881. 56
Summit, 7.8 miles north of, on Colocham Creek, opposite schoolhouse, at west margin of fence; iron post stamped "1767" .....	1, 766. 888
Summit, 10.7 miles north of, on Colocham Creek, in front of E. N. Cook ranch, on east side of road; iron post stamped "971" .....	971. 206

## MALAGA QUADRANGLE.

MALAGA EAST ALONG GREAT NORTHERN RAILWAY TO HAMMOND, THENCE SOUTH TO MILEPOST 1630.

Malaga, 6 feet southeast of milepost 1645; iron post stamped "651 T" .....	651. 843
Iron bridge over Columbia River, 15 feet southwest of, 8 feet south of track, in solid rock; aluminum tablet stamped "677 T" .....	677. 528

Rock Island, opposite station, 30 feet south of rock, 6 feet north of milepost 1639; iron post stamped "615 T" .....	Feet. 615. 217
Milepost 1635, 10 feet west of; iron post stamped "591 T" .....	591. 127
Columbia River station, opposite signpost; top of rail .....	606. 1
Moses Coulee, bridge over, 600 feet east of east end of, 30 feet south of track; iron post stamped "630 T" .....	630. 599
Milepost 1630, 40 feet southwest of; iron post stamped "782 T" .....	782. 530

## POINT 3 MILES EAST OF WENATCHEE EAST AND SOUTH TO ROCK ISLAND.

Wenatchee, 6.0 miles east of, at Dave Horner ranch house, 3 feet from northeast corner of house; iron post stamped "1771" .....	1, 772. 014
Wenatchee, 7.0 miles east of, Fair View ranch, in road, 30 feet south of barn, at north line of wire fence; large rock marked "□ 1549" .....	1, 549. 95
T. 22 N., R. 21 E., sec. 14, at schoolhouse at three-corners, road to south, northeast corner; iron post stamped "1162" .....	1, 162. 964
Wenatchee, 10.8 miles east of, junction of mail road with road to spring and road to river (four mail boxes), 30 feet south of road, large rock marked "□ 1190" .....	1, 190. 69
Rock Island, opposite station, 30 feet south of rock, 6 feet west of milepost 1639; iron post stamped "615 T" .....	615. 248

## POINT 2.6 MILES NORTH OF ROCK ISLAND NORTH ALONG MAIL ROAD UP BADGER MOUNTAIN (SINGLE SPUR LINE).

Rock Island, 4.7 miles north of, on mail road over Badger Mountain, at road to west leading to Mills ranch; iron post stamped "1844" .....	1, 844. 645
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## QUADRANGLE SOUTH OF MALAGA QUADRANGLE.

## MILEPOST 1630 EAST ALONG NORTHERN PACIFIC RAILWAY TO TRINIDAD.

Trinidad, 100 feet east of station; iron post stamped "958 T" .....	958. 334
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## YAKIMA QUADRANGLE.

## COHASSETT WEST ALONG CHICAGO, MILWAUKEE &amp; PUGET SOUND RAILWAY TO BOYLSTON.

Beverly, 6.4 miles west of, at railroad crossing, 45 feet west of, 25 feet south of track; iron post .....	1, 247. 934
Beverly, 8.7 miles west of, 75 feet west of railroad crossing, 15 feet south of rail; iron post .....	1, 511. 451
Rye, switch at west end of water tank, top of west front foundation timber of; spike driven vertically; marked "1755" .....	1, 755. 13
Rye, 1.3 miles west of, 250 feet west of trestle, 15 feet north of track, at east end of railroad cut; iron post stamped "1924" .....	1, 923. 692
Cheviot, in front of station sign; top of rail .....	2, 164. 3
Cheviot, 0.8 mile west of, at railroad overhead crossing of highway, 60 feet east of bridge, at telegraph pole; iron post stamped "2271" .....	2, 271. 010

## BOYLSTON WEST ALONG CHICAGO, MILWAUKEE &amp; PUGET SOUND RAILWAY TO ELLENSBURG.

Boylston, at railroad crossing, at west end of tunnel, 40 feet south of track; iron post stamped "2446" .....	2, 445. 925
Boylston, 4.3 miles west of, 1,680 feet east of Renslow switch, west end of high trestle over wagon road, east end of cut, 7 feet south of track; iron post stamped "2050" .....	2, 050. 155
Boylston, 7.3 miles west of, at corner of wire fence, 200 feet northeast of small cabin, at margin of railroad right-of-way; iron post stamped "1777" .....	1, 776. 679
Kittitas, in front foundation pier of railroad water tank; aluminum tablet stamped "1646" .....	1, 646. 360

Kittitas, 3.4 miles west of, at railroad crossing, west side of road, 15 feet south of track; iron post stamped "1608"..... 1,607.874

POINT 2 MILES EAST OF ELLENSBURG NORTHEAST ALONG HIGHWAY TO POINT NEAR  
SOUTHWEST CORNER OF T. 18 N., R. 20 E.

Ellensburg, 6.4 miles northeast of, at crossroads, at milepost 6, northwest corner; iron post stamped "1836"..... 1,835.507  
Ellensburg, 9.9 miles northeast of, at west corner of road to south; iron post stamped "2031"..... 2,031.403

**Ellensburg and Mount Air Quadrangles.**

**KITTITAS, LEWIS, PIERCE, AND YAKIMA COUNTIES.**

The elevations in the following list were determined by primary leveling extended from the double-rodged line along the Northern Pacific Railway which was re-covered later by the precise-level party of the United States Coast and Geodetic Survey. Other elevations in the Ellensburg quadrangle are given in another list.

The leveling was done in the Ellensburg quadrangle in 1899 by H. K. Kolloch and in the Mount Air quadrangle in 1900 by C. J. Hutchinson and in 1901 by Sidney Arnold.

**ELLENSBURG QUADRANGLE.**

**ELLENSBURG WEST ALONG ROAD VIA MANASTASH CANYON TO T. 17 N., R. 16 E.**

T. 17 N., R. 18 E., quarter corner on south side of sec. 10, 115 feet east of gate to schoolhouse, 5 feet south of fence, 22 feet west of fence corner; iron post stamped "1546 T"..... 1,546.548  
T. 17 N., R. 17 E., sec. 15, first ranch in Manastash Canyon, 350 feet southwest of house and 35 feet southwest of gate, 15 feet north of road; iron post stamped "2135 T"..... 2,134.780  
T. 17 N., R. 16 E., sec. 13, 3 feet east of northeast corner to cabin, 165 feet west of section line, 30 feet south of edge of bench above south fork of Manastash Creek; iron post stamped "2731 T"..... 2,731.096

**ELLENSBURG SOUTHWEST ALONG ROAD VIA SHUSHUSKIN CANYON TO WENAS CREEK, THENCE  
SOUTHEAST DOWN WENAS CREEK TO SELAH STATION.**

T. 17 N., R. 18 E., sec. 34, head of Shushuskin Canyon, 15 feet south of road, 25 feet east of junction with Durr road to Yakima; iron post stamped "2387 T"..... 2,387.239  
T. 16 N., R. 18 E., northwest corner of sec. 6, 500 feet south of road, 16 feet southeast of fence corner; iron post stamped "2837 T"..... 2,837.164  
T. 16 N., R. 17 E., sec. 5, Umptanum and Wenas Creeks, summit of pass between, 12 feet south of road; iron post stamped "3128 T"..... 3,127.984  
T. 16 N., R. 16 E., sec. 13, mouth of Kittitas Canyon, 1 foot north of fence, 8 feet south of 3.5-foot pine tree, 45 feet south of road forks, 500 feet southwest of junction of Ellensburg-Yakima road with road up Wenas Creek; iron post stamped "2266 T"..... 2,266.450  
T. 16 N., R. 17 E., sec. 32, 65 feet north of east gate to barn of Burge's ranch, 500 feet southwest of house, 5 feet south of road, in small group of young trees; iron post stamped "2008 T"..... 2,008.489  
T. 15 N., R. 17 E., sec. 3, 1,000 feet west of Chamberlain ranch, in top of flat rock shelf 15 feet south of road, in bend around point of hill; bronze tablet stamped "1883 T"..... 1,883.741

	Feet.
T. 15 N., R. 17 E., northeast corner of sec. 24, 90 feet south of bridge over branch of Wenas Creek, at road fork to North Yakima, via Selah Valley, 2 feet north of fence and 15 feet south of Naches River road; iron post stamped "1622 T" .....	1, 622. 056
T. 14 N., R. 18 E., southwest corner of sec. 2, 25 feet east of old Durr road, at junction with Wenas road and 50 feet north of main road, 3 feet south of fence, 450 feet west of Ruby house; iron post stamped "1318 T" .....	1, 318. 165
QUINN'S ROAD ON WENAS CREEK SOUTHWEST ACROSS BRIDGE TO NACHES RIVER, THENCE SOUTHEAST TO NORTH YAKIMA.	
T. 14 N., R. 17 E., north side of sec. 2, summit of pass between Wenas Creek and Naches River, 25 feet southeast of road; iron post stamped "1917 T" .....	1, 917. 171
T. 14 N., R. 17 E., north side of sec. 11, 2 feet northeast of fence, 50 feet southwest of road, 845 feet northwest of lane leading past schoolhouse; iron post stamped "1502 T" .....	1, 502. 271
T. 14 N., R. 18 E., sec. 30, 1,000 feet north of schoolhouse, 5 feet west of junction of Naches road with lane, inside wire fence corner; iron post stamped "1331 T" .....	1, 331. 166
T. 13 N., R. 18 E., sec. 9, 300 feet north of schoolhouse at Cowiche Creek road crossing, 100 feet west of road, 60 feet east of irrigating ditch siphon, in top of boulder 5 by 9 feet; bronze tablet stamped "1180 T" .....	1, 180. 859
LINE WEST UP SOUTH FORK OF WENAS CREEK AND SOUTHEAST DOWN NACHES RIVER TO SEC. 11, T. 14 N., R. 17 E.	
T. 16 N., R. 15 E., about sec. 13 (unsurveyed), 2 miles east of summit of upper pass between Wenas Creek and Naches River, 30 feet south of road at east end of open flat, between blazed pine trees each 12 feet distant; iron post stamped "3863 T" .....	3, 863. 526
T. 16 N., R. 15 E., about sec. 21 (unsurveyed), 3 feet southwest of northwest corner of dwelling house of Mehaffy ranch, at junction of Naches and Wenas roads, 0.8 mile northwest of upper ford of Naches River; iron post stamped "2138 T" .....	2, 139. 092
T. 15 N., R. 15 E., northeast corner of sec. 13, 3 feet west of gate to Stevens house, Buckeye ranch, 2 feet south of fence, 10 feet north of road; iron post stamped "1855 T" .....	1, 854. 899
T. 15 N., R. 16 E., sec. 34, 125 feet north of house at west end of oak flat, F. V. Hansen ranch, east end of grade over hill, 75 feet south of cliff talus, in small point of outcropping ledge; bronze tablet stamped "1661 T" .....	1, 661. 154
T. 15 N., R. 17 E., sec. 31, inside fence at Lamberson ranch, 4 feet west of gate leading to house, 50 feet west of road crossing at Wapata ditch; iron post stamped "1568 T" .....	1, 568. 178
UP TIETON RIVER FROM MOUTH SOUTHWEST TO T. 14 N., R. 15 E.	
T. 14 N., R. 16 E., sec. 2, Timm ranch, 3 feet north of southeast corner of stone foundation of milk house; iron post stamped "1681 T" .....	1, 681. 579
T. 14 N., R. 15 E., about sec. 13 (unsurveyed), 0.8 mile west of Harper ranch, 1,000 feet west of west branch of dry watercourse from deep canyon to north, 60 feet north of cleared field and 600 feet north of Tieton River, 9 feet south of 25-foot outcropping point at base of high rock cliff; iron post stamped "1958 T" .....	1, 958. 754
NACHES RIVER WEST UP COWICHE CREEK AND EAST DOWN ATANUM CREEK TO OLD YAKIMA.	
T. 13 N., R. 17 E., sec. 3, North and South forks of Cowiche Creek, 60 feet northeast of low point of divide between outside of wire fence, 30 feet northwest of main road; iron post stamped "1570 T" .....	1, 570. 212

T. 14 N., R. 17 E., sec. 31, Oak Grove creamery, 10 feet west of gate to lane leading to; 3 feet south of fence; iron post stamped "1824 T" .....	Feet. 1, 823.584
T. 14 N., R. 16 E., sec. 33, 675 feet east of mouth of McDaniel Canyon, 100 feet north of creek, 50 feet north of road, in face of outcropping lava formation at base of low basalt cliff; bronze tablet stamped "2204 T" .....	2, 203.858
T. 13 N., R. 16 E., in northwest corner sec. 18, Louis Christensen ranch, 100 feet west of forks of main road with road to; 20 feet south of road and 3 feet north of branch road, at forks of South Fork of Cowiche Creek, on granite ledge; bronze tablet stamped "2632 T" .....	2, 631.763
T. 13 N., R. 15 E., sec. 27, summit of pass between Cowiche and Atanum Creeks, 0.8 mile from Cowiche Creek, in shallow sag at head of draw, 0.8 mile above sawmill; blazed pines are east, south, and west; iron post stamped "3686 T" .....	3, 685.335
T. 12 N., R. 15 E., sec. 2, opposite Hinckle ranch house, northeast side of road and 3 feet from fence, 300 feet southeast of Nasty Creek road crossing; iron post stamped "2463 T" .....	2, 462.185
Tampico, sec. 18, T. 12 N., R. 16 E., 100 feet east of old store, at forks of road to north and south and at forks of Atanum Creek, south side of main road, 2 feet north of fence and 6 feet east of fence corner; iron post stamped "2127 T" .....	2, 116.217
T. 12 N., R. 17 E., 930 feet east of west side of sec. 18, 30 feet north of road, 9 feet west of wire fence corner; iron post stamped "1703 T" .....	1, 692.052
T. 12 N., R. 17 E., west side of sec. 10, 275 feet southeast of schoolhouse, 3 feet inside corner of wire fence on northeast corner of crossroads; iron post stamped "1479 T" .....	1, 468.575
T. 12 N., R. 18 E., west side of sec. 3, 600 feet southeast of schoolhouse, 45 feet north of road in jog of fence; iron post stamped "1066 T" .....	1, 066.145

## HARPER RANCH WEST ALONG TIETON RIVER.

T. 14 N., R. 15 E., 6 miles west of Harper ranch, 40 feet west of creek, north of trail on left bank and 150 feet north of Tieton River, opposite a steeple rock about 75 feet wide and 250 feet high; iron post stamped "2236 T" .....	2, 237.030
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## BENCH MARKS ESTABLISHED BY THE UNITED STATES RECLAMATION SERVICE.

T. 13 N., R. 17 and 18 E., quarter corner between secs. 19 and 24, 8 miles west of North Yakima, 40 feet north of Cowiche telephone line, 20 feet north of Cowiche road, 3 feet north of fence corner and corner of Alvin Bair's homestead; iron post stamped "1354" .....	1, 354.060
T. 14 N., R. 17 E., corner of secs. 20, 21, 28, and 29, 1.8 miles north of Cowiche post office, 300 feet northeast of Austin house, 800 feet west of Chambers house, 4 feet from northeast corner of fence, at angle in road; iron post stamped "1751" .....	1, 751.047
T. 14 N., R. 16 E., 30 feet southwest of northeast corner to sec. 13, 20 feet west from range line, 10 feet west and 3 feet south of road at right angle bend, 0.25 mile east of Louis Lanch house, 0.5 mile north of North Fork schoolhouse; iron post stamped "1971" .....	1, 970.978
T. 14 N., R. 16 E., on line between secs. 10 and 11, 600 feet north of corner of secs. 10, 11, 14, and 15, 70 feet north of North Fork of Cowiche Creek, 800 feet east of house on French place, 30 feet north of road and fence corner, beside wire fence; iron post stamped "2183 T" .....	2, 183.058
T. 14 N., R. 17 E., near center of sec. 8, 0.25 mile from small lake and reservoir, 800 feet southeast of Lake triangulation signal, 100 feet east of reservoir embankment, 80 feet southeast of Hill house, 3 feet from south-east corner fence inside; iron post stamped "1957 T" .....	1, 956.961

T. 14 N., R. 17 E., 40 feet southeast of northwest corner of sec. 27, 30 feet east of fence corner, 2 feet north of fence; iron post stamped "1872 T" . .	Feet. 1, 872. 013
T. 13 N., R. 17 E., 300 feet south of northeast corner of sec. 12, 2,000 feet southeast of triangulation signal Burlingame, 50 feet west of range line, 200 feet south of scab rock hill, 50 feet east of spur of scab rock leading from hill; iron post stamped "1731 T" . . . . .	1, 731. 081

## MOUNT AIX QUADRANGLE.

## EAST SIDE OF TIETON BASIN WEST ALONG TIETON RIVER AND INDIAN CREEK TO COWLITZ PASS.

Tieton Basin, east side, at ford, 40 feet south of Tieton River, in rocky ground between two pine trees; iron post stamped "2452 T" . . . . .	2, 452. 386
South Fork of Tieton River, 200 feet east of, near mouth, on south side of trail to fork, 6 feet east of lone tamarack tree; iron post stamped "2785 T" . .	2, 785. 558
Russell ranch, 1,160 feet west of barn, 200 feet north of main trail to Cowlitz Pass, on hillside overlooking hay field, on top of irregular mass of out-cropping basalt; bronze tablet stamped "2932 T" . . . . .	2, 932. 341
Indian Creek, 4 miles above mouth, west of deep gorge of, on right side of trail on steep ascent to summit, west of small spring creek, on top of solid block of basalt; bronze tablet stamped "3719 T" . . . . .	3, 719. 758
Cowlitz Pass, on south side of trail at forks, at base of small hill, west of small lake, on top of a mass of basalt rock about 6 by 6 by 3 feet; bronze tablet stamped "5191 T" . . . . .	5, 191. 551

## CHRISTENSEN RANCH ON COWICHE CREEK TO SUMMIT BETWEEN COWICHE CREEK AND TIETON RIVER.

T. 13 N., R. 14 E., 400 feet west by 200 feet north of southeast corner of sec. 2, on top of extreme point of Cowiche Ridge overlooking Russell trail, Goose Egg Mountain and Tieton Basin, in solid mass of basalt; bronze tablet stamped "5745 T" . . . . .	5, 744. 893
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## MEHAPPEY RANCH UP NACHES RIVER AND AMERICAN RIVER TO GOLD HILL.

Gold Creek, 100 feet east of crossing, 9 feet east of center of trail, in large flat rock; bronze tablet stamped "2437 T" . . . . .	2, 437. 589
Bumping River, 800 feet above mouth of, 90 feet northeast from where Bumping River trail crosses Naches River, 10 feet north of trail, 80 feet north of north edge of Naches River; iron post stamped "2557 T" . . . . .	2, 557. 286
American River, 2.5 miles northwest of mouth, 25 feet north of bank, 4 feet north of trail where it turns over hill, in flat rock 4 by 12.5 by 9.5 feet; bronze tablet stamped "2937 T" . . . . .	2, 937. 014
Pleasant Prairie, 20 feet north of northeast corner of old cabin, 54 feet north of American River, 8 feet west of flag pole; iron post stamped "3337 T" . .	3, 336. 910
Bear Gap, summit of Cascade Mountains, 10 feet east of Buckley trail; iron post stamped "5882 T" . . . . .	5, 882. 209
Bear Gap, 1.5 miles northwest of, 600 feet northwest of second creek crossing, 100 feet west of trail, in large rock; bronze tablet stamped "4518 T" . .	4, 518. 533

## MOUTH OF AMERICAN RIVER TO BUMPING LAKE.

Goose Prairie, northeast corner of cabin, 280 feet south of trail, 280 feet north of river, 500 feet east of "Old Man Fife" grave; iron post stamped "3265 T" . . . . .	3, 265. 836
Bumping Lake, 120 feet northeast of lower end of (northeast end), at head of Bumping River, 10 feet north of trail, 30 feet north of old fence; iron post stamped "3407 T" . . . . .	3, 407. 764

**Chiwaukum, Mount Stuart, Skykomish, Snoqualmie, and Sultan Quadrangles.****CHELAN, KING, KITTITAS, PIERCE, AND SNOHOMISH COUNTIES.**

The elevations in the following list were determined by primary leveling extended from a double-rodged line along the Northern Pacific Railway, which was re-covered later by the precise-level party of the Coast and Geodetic Survey.

In Snoqualmie and Mount Stuart quadrangles additional elevations will be found in the list for the line along the Northern Pacific Railway.

The leveling was done as follows: Snoqualmie quadrangle in 1897 by Frank Cole, in 1898 by H. K. Kallock, in 1900 by C. J. Hutchison, and in 1910 by D. S. Birkett; Mount Stuart quadrangle in 1896 by Cole; Skykomish quadrangle in 1897 by G. N. Pratt and in 1898 by H. K. Kallock; Sultan quadrangle in 1898 by Kallock; and Chiwaukum quadrangle in 1898 by R. A. Farmer and Kallock, in 1900 by E. M. Fry, and in 1901 by C. E. Hill.

**SULTAN QUADRANGLE.****INDEX (ON SPUR LINE FROM PESHASTIN).**

Index, at station, 40 feet southwest of agent's window, 27 feet southwest of track; iron post stamped "532 T".....	Feet. 532. 176
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**SILVERTON SOUTH ALONG TRAIL OVER DIVIDE AND DOWN WILLIAMSON CREEK TO SULTAN RIVER (PORTION OF SPUR LINE).**

T. 29 N., R. 9 E., north bank of Sultan River, 50 feet east of north end of bridge over river, 600 feet east of mouth of Williamson Creek, in bed rock; copper bolt stamped "1413".....	1, 414. 339
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**GRANITE FALLS SOUTH TO LAKE ROESIGER.**

Lake Roesiger, 100 feet east of Nesbeth barn, 150 feet left of trail, in bowlder; copper bolt stamped "619".....	619. 930
Lake Roesiger, surface of water.....	568

**SKYKOMISH QUADRANGLE.****CLEALUM ALONG HIGHWAY NORTH TO FISH LAKE (PORTION OF SPUR LINE).**

Fish Lake, at foot of; water level June 25, 1898.....	3, 325. 4
Fish Lake, in open meadow east of, 90 feet east of road, 105 feet north of small double log cabin, 125 feet west of edge of timber, in granite bowlder 6 by 7 by 9 feet; aluminum tablet stamped "3371 T".....	3, 372. 708
Fish Lake, near head of; water level June 27, 1898.....	3, 326. 4

**PESHASTIN ALONG GREAT NORTHERN RAILWAY WEST TO INDEX (PORTION OF SPUR LINE).**

Cascade Tunnel, 12.5 feet west of main track, 120 feet north of water tank, 780 feet north of main switch, 90 feet southwest of tool house; iron post stamped "3373 T".....	3, 373. 835
Cascade Summit, 225 feet south of section house at, 13 feet west of main track in curve, 345 feet south of north switch of side track; iron post stamped "4061 T".....	4, 061. 486
Wellington, 16 feet north of new station, 15 feet south of section house, 20 feet east of main track; iron post stamped "3114 T".....	3, 114. 779
Madison, 75 feet southeast of roundhouse, 45 feet east of dwelling house, 16 feet south of main track, 260 feet west of east end of side track, 15 feet east of 26-inch stump; iron post stamped "2106 T".....	2, 106. 488



Madison, 7 miles from, 5 miles from Skykomish, 9 feet east of track in south end of small gravel pit, 600 feet south of signboard "Bridge 418 1 mile,"	Feet.
420 feet north of milepost 1734; iron post stamped "1389 T" .....	1, 389. 706
Skykomish, 80 feet west of station, 20 feet east of water tank, 15 feet south of main track; iron post stamped "930 T" .....	930. 116
Salmon, 12 feet north of track and 130 feet east of switch at west end of side-track; iron post stamped "759 T" .....	759. 716

## INDEX NORTHEAST ALONG HIGHWAY TO MINERAL CITY (PORTION OF SPUR LINE).

Galena, 6 feet southwest of corner of Silver Creek store, 12 feet east of road; iron post stamped "1110 T" .....	1, 110. 747
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## MONTE CRISTO SOUTH ALONG EVERETT &amp; MONTE CRISTO RAILWAY TO POINT NEAR SILVERTON.

Monte Cristo station, 247 feet north of freight platform, 20 feet east of switchback, in large rock north of Everett & Monte Cristo Railway trestle; copper bolt stamped "2772" .....	2, 774. 073
Bridge 51, 210 feet east of, on hemlock stump 30 inches in diameter, 20 feet north of center of track .....	2, 510. 154

## CHIWAUKUM QUADRANGLE.

## CAMAS CREEK NORTH TO PESHAISTIN.

County road, south side of Wenatchee River, at junction of Peshastin road with, 5 feet north of road forks, 12 feet west of fence corner, 2 feet south of wire fence, 85 feet south of 14 by 20 foot log cabin; iron post stamped "1103 T" .....	1, 103. 771
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## WENATCHEE NORTHWEST ALONG GREAT NORTHERN RAILWAY TO INDEX (SPUR LINE).

Peshastin station, Great Northern Railway, 65 feet southeast of wagon road, 75 feet southwest of track at road crossing and mail catch, 20 feet southeast of small board shack; iron post stamped "1045 T" .....	1, 046. 012
Peshastin, 2.3 miles west of, 6 feet north of track, 12 feet southwest of point of bluff at west end of sand-rock grading along Wenatchee road, 20 feet east of small ravine and filling; iron post stamped "1095 T" .....	1, 096. 028
Leavenworth, 120 feet southwest of station office, 5 feet southeast of platform, 3.5 feet southwest of low building; iron post stamped "1165 T" ..	1, 165. 593
Leavenworth, 2.6 miles from, 3,810 feet north of milepost 1676, 6 feet east of track, under low bank and 20 feet east of large bowlder; iron post stamped "1309 T" .....	1, 310. 003
"Big Eddy" of Wenatchee River, east of, 4.5 feet west of track, 150 feet north of milepost 1679, at south end of cut around high rock point; iron post stamped "1556 T" .....	1, 556. 309
Leavenworth, 8.2 miles northwest of, 13.5 feet east of track, directly east of small island in Wenatchee River, 360 feet southeast of rocky point at track curve, 1,950 feet south of milepost 1682; iron post stamped "1647 T" ..	1, 647. 468
Chiwaukum, 40 feet south of corner of section house, 60 feet southeast of mail catch and switch, 40 feet northeast of track, 4 feet north of telegraph pole; iron post stamped "1814 T" .....	1, 815. 054
Chiwaukum Divide (Little Summit), about 750 feet south of top of; top of east rail at road crossing and track sign .....	2, 084. 5
Chiwaukum Summit, at north end of dirt cut at, 3.4 miles north of Chiwaukum, 19 feet east of track, 455 feet north of milepost 1687; iron post stamped "2083 T" .....	2, 083. 288
Nason Creek, 19 feet south of sign post, 975 feet east of switch at west end of side track at, 13 feet north of track; iron post stamped "2162 T" .....	2, 162. 243

Merritt, 133 feet northwest of water tank, 15 feet southeast of 2.5 foot stump 6 feet from track, 11 feet southwest of main track; iron post stamped "2186 T".....	Feet. 2, 186. 306
Merritt, 3.0 miles west of, 11 feet southwest of track at cut around rock point, 1,530 feet west of trestle 384, 930 feet east of bridge 385, iron post stamped "2485 T".....	2, 485. 840
Berne, 180 feet east of switch to spur, 7.5 feet south of main track, 225 feet west of water tank; iron post stamped "2918 T." (This bench mark was lowered 0.5 foot December 13, 1904, by order of superintendent of rail- road, as it interfered with and endangered lives of trainmen, and the elevation was corrected) .....	2, 918. 170

MOUTH OF EAGLE CREEK ALONG HIGHWAY AND TRAIL TO SUMMIT OF DIVIDE, THENCE WEST  
DOWN CHUMSTICK CANYON TO NORTHUP RANCH.

Bellvue ranch, 10 feet south of large gate at west entrance, 2 feet from fence, 10 feet south of road, iron post stamped "1360 T".....	1, 360. 374
Smith ranch, 1,000 feet west of house, 50 feet west of large entrance gate and 200 feet southwest of barn; iron post stamped "1984 T".....	1, 984. 591
Chumstick Canyon, on summit of divide between Eagle and Chumstick Creeks, at root of pine tree; aluminum tablet stamped "3270 T".....	3, 270. 904

UP STROMBERGS CANYON NORTHWEST TO DIVIDE BETWEEN STRAWBERRY CREEK AND  
WENATCHEE RIVER (SPUR LINE).

Strombergs Canyon, 0.1 mile east of summit, on north side of and 150 feet west from mouth of, in large boulder; aluminum tablet stamped "1767 T".....	1, 768. 133.
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CHUMSTICK SCHOOLHOUSE, AT MOUTH OF SCHOOLHOUSE CANYON, WEST ALONG OLD ROAD  
TO CHIWAUKUM.

Chumstick schoolhouse, 800 feet east of, at forks of road; iron post stamped "1631 T".....	1, 631. 897.
Chumstick schoolhouse, 2.0 miles west of, at summit between Schoolhouse Canyon and Wenatchee River, at north side of road, in root of pine tree; nail.....	2, 116. 21

CHIWAUKUM WEST UP CHIWAUKUM CREEK TO BROWN BEAR MINING CAMP (SPUR LINE).

Brown Bear mine, 250 feet north of, 300 feet northwest of falls of Chiwaukum Creek, 10 feet north of trail, 100 feet north of creek; iron post stamped "2374 T".....	2, 374. 846
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UP CHUMSTICK, LITTLE CHUMSTICK, AND WENATCHEE RIVERS TO WENATCHEE LAKE, THENCE  
SOUTH TO CHIWAUKUM SUMMIT.

Chumstick Canyon, mouth of, 5 feet east of trail and 500 feet southeast of road, in top of stump; nail.....	1, 734. 52
Burgess ranch, 300 feet southwest of house at gate, 5 feet west of fence, 150 feet south of Beaver Creek bridge; iron post stamped "1882 T"....	1, 882. 20
Coal mines, 500 feet north of shaft house, 10 feet south of road, in root of pine tree; nail.....	2, 008. 99
Wenatchee Lake, 500 feet southeast of bank at foot of, at old steamer land- ing, 150 feet east of Wenatchee River, 150 feet north of old log shack; iron post stamped "1880 T".....	1, 880. 368
Wenatchee Lake, foot of, water level 8.30 a. m., August 20, 1900.....	1, 870

WENATCHEE LAKE WEST 4 MILES UP WHITE RIVER (SPUR LINE).

Wenatchee Lake, 150 feet southwest of house on Bates ranch, 5 feet inside of fence, 50 feet from bank at head of lake; iron post stamped "1873 T"..	1, 874. 052
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Bates ranch, 4.0 miles north of, 5 feet east of trail up White River, 300 feet north of third bend in river; iron post stamped "1905 T"..... 1, 905. 923

LEAVENWORTH (SHUGART RANCH) NORTH ALONG HIGHWAY AND CHIWAWA CREEK TRAIL TO BUCK CREEK PASS (PORTION OF LINE).

Foster ranch, 300 feet northwest of house, 10 feet west of road to Lakeview mine, in root of pine tree; nail; marked "2027"..... 2, 027. 48  
 Deep Creek, 100 feet south of, in forks of Chiwawa Creek trail and road to Lakeview mine, in root of fir tree 1 foot east of trail; nail..... 2, 238. 88  
 Deep Creek, 100 feet south of, in forks of Chiwawa Creek trail and road to Lakeview mine, 5 feet north of road; iron post stamped "2239 T"..... 2, 239. 681  
 Cross Creek, 0.5 mile northwest of, 4 feet northeast of trail, in root of big fir; nail; marked "2174"..... 2, 174. 59  
 Alder Creek, 28 feet south of bridge over, 10 feet east of trail; iron post stamped "2137 T"..... 2, 137. 777  
 Alder Creek, 2.0 miles northwest of, 1 foot south of trail, top of pointed rock about 2 feet high at summit of hill..... 2, 567. 60  
 Twin Creek, 8 feet north of, 2 feet west of trail, in root of black pine tree; nail marked "2348"..... 2, 348. 12  
 Grouse Creek, 500 feet south of, 6 feet east of trail, in root of black pine tree; nail marked "2501"..... 2, 501. 36  
 Chickman Creek, 70 feet southeast of trail crossing (ford), in base of large pine tree; nail..... 2, 438. 97  
 Chickman Creek, 60 feet southeast of trail crossing (ford), 12 feet northwest of large pine tree; iron post stamped "2438 T"..... 2, 438. 588  
 Chickman Creek, surface of water at trail crossing; August 17, 1901.... 2, 431. 9  
 Chickman Creek, 2.7 miles northwest of, 3 feet east of trail, 780 feet northwest of small stream, in root of tall pine tree; nail marked "2489"..... 2, 489. 81  
 Rock Creek, 1.0 mile southeast of, 3 feet west of trail, on large rock 9 feet square and 6 feet high, in south face; bronze tablet stamped "2512 T".... 2, 512. 652  
 Rock Creek, at trail crossing; surface of water August 23, 1901..... 2, 499. 1  
 Rock Creek, 1.3 miles northwest of, 8 feet west of trail, in root of big fir tree; nail marked "2502"..... 2, 502. 20  
 Rock Creek, 3.4 miles northwest of, 7 feet west of trail, 100 feet north of dry rocky creek bed, in root of spruce tree; nail marked "2578"..... 2, 578. 46

SNOQUALMIE QUADRANGLE.

CLEALUM NORTH ALONG HIGHWAY TO FISH LAKE (PORTION OF SPUR LINE).

Ronald, south side of sec. 7, T. 20 N., R. 15 E., northeast side of main street, at southeast corner of old Northern Pacific Coal Co.'s boarding house, 500 feet south of track; iron post stamped "2345 T"..... 2, 346. 322  
 Clealum Lake, foot of, west side of sec. 2, T. 20 N., R. 14 E., 150 feet east of lake, just east of road and 20 feet from northwest corner of Lake View House; iron post stamped "2150 T"..... 2, 151. 572  
 Clealum Lake, foot of; water level May 24, 1898..... 2, 127. 8  
 Clealum Lake, head of, in highest point of large granite boulder 15 feet from, 30 feet from road; aluminum tablet stamped "2140 T"..... 2, 141. 269  
 Morgan ranch, 200 feet east of, 15 feet west of road and 3 feet from fence; iron post stamped "2157 T"..... 2, 158. 537  
 Big Salmon La Sac, 10 feet west of road, 6 feet from edge of low river bench, 150 feet east of river; iron post stamped "2394 T"..... 2, 395. 741  
 Clearing, containing 3 deserted cabins, on edge of and just east of road, in top of large boulder with "U.S.M.M.No.2, Cle Elum Mining District" cut on west face; aluminum tablet stamped "2838 T"..... 2, 839. 842

Boulder Creek, 100 feet south of bridge over, 30 feet southeast of road, 12 feet northeast and 20 feet northwest from deserted log cabins, 50 feet southwest from 6 by 9 granite boulder; iron post stamped "2895 T".....	Feet. 2, 896. 522
Camp Creek ford, 20 feet south of, 100 feet southeast of old log cabin on bench east of road; iron post stamped "3086 T".....	3, 087. 175
Fortune Creek, 30 feet north of north end of bridge over, 18 feet east of road; iron post stamped "3204 T".....	3, 205. 046

## EASTON NORTH ALONG HIGHWAY TO LAKE KACHEES (SPUR LINE).

Lake Kachees, at end of road 45 feet west of old cabin built of square logs, 50 feet from edge of lake and 675 feet north of boathouse; iron post stamped "2235".....	2, 230. 490
Lake Kachees; surface of water September 6, 1897 .....	2, 222. 0

## MARTIN NORTH ALONG HIGHWAY TO SNOQUALMIE PASS (SPUR LINE).

Lake Keechelus, at south end of, 40 feet north of wagon road, 120 feet south of old sawmill site at foot of lake, 500 feet southwest of ford at head of Yakima River, 20 feet south of bench mark is 3-foot hemlock tree blazed on three sides; iron post stamped "2479".....	2, 475. 356
Gold Creek trail, directly opposite and 6 feet south of road, small burn east of bench mark; iron post stamped "2502".....	2, 498. 470

## MOUTH OF BUMPING RIVER NORTH TO MATHEWS CABIN (PORTION OF SPUR LINE).

Mathews cabin, 1.0 miles southeast of, on summit of road, on trail 0.5 mile northwest of where it leaves river; iron post stamped "3119 T".....	3, 118. 968
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NOTE.—The United States Reclamation Service has established the following bench marks in the Snoqualmie quadrangle:

## "A" LINE FOR CONTROL OF CLEALUM DAM SITE.

Lake Clealum, 10 feet on right side of main road from Clealum to Fish Lake, directly in front of the Lake View House, 175 feet from lake, 8.0 miles from Clealum; iron post stamped "2150 T" (permanent bench mark No. 1).....	2, 151. 572
Lake Clealum, near outlet of, 500 feet nearly east of house at present dam, 20 feet north of trail running east from said house and 250 feet due north of Clealum River at point 760 feet below dam (1965), some 30 feet southeast of dead fir blazed and marked "2192.435;" iron post stamped "2192" (permanent bench mark No. 2).....	2, 193. 757
Lake Clealum, 1,000 feet below outlet, on left bank directly above Government gaging station and 200 feet north of same, 20 feet north of trail leading south from house at outlet, on top of high ridge, 550 feet east of bench mark No. 2; two blazed pines are within 50 feet, marked "2248.886" and "2250.661;" 120 feet above river gage; iron post stamped "2249" (permanent bench mark No. 3).....	2, 250. 803

## "B" LINE FOR CONTROL OF KACHEES DAM SITE.

Lake Kachees, at end of road, 45 feet west of old cabin built of square logs, 50 feet from edge of lake, 675 feet north of boathouse; iron post stamped "2235" (permanent bench mark No. 1).....	2, 230. 490
Lake Kachees, near outlet of lake, on east side of river, 300 feet southeast of crib dam, 200 feet east of house on road side, 10 feet west of station 2 (P. T. sheet No. 1, Kachees dam site); iron post stamped "2253" (permanent bench mark No. 2).....	2, 249. 027

Lake Kachees, near outlet of lake, on west side of river, 400 feet north of west from crib dam, 15 feet south of west from station 4 (P. T. sheet No. 1, Kachees dam site); iron post stamped "2250" (permanent bench mark No. 3) .....	Feet. 2, 245. 686
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"C" LINE FOR CONTROL OF KEECHELUS DAM SITE.

Lake Keechelus, 30 feet west of public road, 68 feet east of lake, 450 feet south of Christopher Hansen's house, 500 feet south of outlet to lake; iron post stamped "2479" (permanent bench mark No. 1).....	2, 475. 421
Lake Keechelus, on ridge near outlet of lake, 205 feet north of timber dam on Yakima River, 190 feet east of public road, 500 feet east of lake; iron post stamped "2510" (permanent bench mark No. 2).....	2, 506. 135

NOTE.—The following bench marks were established by D. S. Birkett in cooperation with the State in 1910 in connection with leveling in the Cedar Lake quadrangle.

HUMPSBACK CREEK FILL (1 MILE EAST OF RAINY CREEK) NORTHEAST ALONG HIGHWAY TO SNOQUALMIE PASS, TYING AT THAT POINT WITH SPUR LINE NORTHWEST ALONG HIGHWAY FROM MARTIN.

Rockdale, 0.4 mile west of, west end of trestle FF 82 (being filled), 30 feet south of track, copper bench mark nail in notch cut in base of fir stump 2 feet in diameter and 3 feet high; aluminum tag stamped "2485" .....	Feet. 2, 485. 36
Rockdale, 8 feet north of track, in concrete abutment of water tank; aluminum tablet stamped "Prim. Trav. Sta. No. 11, 1910, 2508 WASH" .....	2, 507. 979
Laconia, 200 feet west of station, in foundation of water tank at east end; copper bench mark nail; aluminum tag stamped "3003" .....	3, 003. 85
Snoqualmie Pass, 8 feet south of road at summit, 0.25 mile west of small lake in marsh north of road; iron post stamped "3131" and "3127 WASH" ..	3, 127. 173

MOUNT STUART QUADRANGLE.

\* CLEALUM NORTHWEST ALONG ROSLYN BRANCH RAILROAD TO ROSLYN.

Roslyn, SE. $\frac{1}{4}$ sec. 17; T. 20 N., R. 15 E.; 221.4 feet north of the center of north doorway of new brick power house at Roslyn Mines, in center of railroad track; iron post stamped "2222" .....	2, 218. 324
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ELLENSBURG NORTHWEST ALONG HIGHWAY TO M'CALLUM, THENCE WEST TO TEANAWAY RIVER, THENCE SOUTHWEST TO TEANAWAY.

Ellensburg, in front of station; top of rail.....	1, 510. 08
T. 18 N., R. 18 E., 0.25 mile north of sec. 28, near fence post, just northwest of intersection of north-south road, 125 feet northeast of white school-house; iron post stamped "1576" .....	1, 570. 902
T. 18 N., R. 18 E., west of center of sec. 6, 0.8 mile southeast of road fork north to Green Canyon, 50 feet southwest of center of Dry Creek road; iron post stamped "1841" .....	1, 836. 176
T. 19 N., R. 17 E., 550 feet west of northeast corner of sec. 16, divide between Dry Creek and Horse canyons, near road at summit, 22 feet north of north end of small bridge over an irrigation ditch; iron post stamped "2574" .....	2, 568. 369
McCallum, about 900 feet south of northwest corner of sec. 27, T. 20 N., R. 17 E., about 20 feet southeast of center of intersection of road with Clealum road, 62 feet south by southwest from door of post office, just east of section line; iron post stamped "2178" .....	2, 173. 535

T. 20 N., R. 16 E., southeast corner of sec. 24, Teahaway River road; in center of small triangle formed by roads, about 15 feet west of section corner on township line; iron post stamped "1991"..... 1, 986. 289

## M'CALLUM NORTH UP SWAUK CREEK OVER DIVIDE AND DOWN PESHAISTIN CREEK.

Liberty post office, near center of sec. 10, T. 20 N., R. 17 E., 155 feet south of front door of post office, 95 feet southeast from southwest corner of new house; iron post stamped "2417"..... 2, 411. 967  
 Swauk and Peshastin creeks, divide between, 20 feet west of road; iron post stamped "4071"..... 4, 066. 265  
 Swauk-Peshastin divide, first cabin north of, east side of road and opposite, about 3.8 miles south of Blewett, cabin is on opposite side of creek from road and four trees are blazed; iron post stamped "2784"..... 2, 778. 968  
 Blewett post office, 70 feet west of front door of, 125 feet from southeast corner of engine house of stamp mill; iron post stamped "2328"..... 2, 323. 086  
 Peshastin Creek, bridge over, about 80 feet south of, and 300 feet south of junction of Ingalls and Peshastin creeks, on east side of trail; trees blazed in vicinity; iron post stamped "1822"..... 1, 817. 276  
 Peshastin Creek, junction of road down, with road from Camas, 25 feet southwest from, 125 feet southwest from southwest end of small bridge on main road; iron post stamped "1513"..... 1, 507. 886

## PESHAISTIN CREEK SOUTHEAST UP CAMAS CREEK OVER DIVIDE AND NORTH DOWN BRENDER CANYON TO MISSION.

T. 23 N., R. 18 E., unsurveyed, Robinson & Bluett's sawmill, 0.25 mile east of, 6 feet north of road at summit of divide between Brender Canyon and Camas Creek; iron post stamped "3029 T"..... 3, 029. 639

## PESHAISTIN CREEK WEST UP NIGGER CREEK TO DIVIDE.

Patterson's cabin, 25 feet north of, about 7 miles up the creek and near its head; iron post stamped "5769"..... 5, 763. 682  
 Falls and Cascade creeks, ridge between, running north from a high mountain just west of Nigger Creek and Falls Creek divide, and about 300 feet south and 25 feet east of highest point of north end of ridge; iron post stamped "6257"..... 6, 251. 900

## LIBERTY NORTHEAST UP WILLIAMS CREEK ROAD 4 MILES.

T. 21 N., R. 18 E., sec. 31, unsurveyed, headwaters of Williams Creek, 20 feet east of intersection of last road and between two roads; iron post stamped "3403"..... 3, 397. 610

## NORTH UP GREEN CANYON ROAD TO GREEN CANYON.

T. 19 N., R. 18 E., W.  $\frac{1}{2}$  sec. 31, 0.5 mile east of Green Canyon, at first road running from Green Canyon after leaving Dry Creek, on the east side of a small ravine; iron post stamped "1967"..... 1, 961. 500  
 T. 19 N., R. 18 E., W.  $\frac{1}{2}$  sec. 7, Dry Creek, at forks of road, about 5 miles from, 30 feet east of intersection with road running to west up a steep hill; iron post stamped "2649"..... 2, 644. 128  
 T. 20 N., R. 18 E., SW.  $\frac{1}{4}$  sec. 31, unsurveyed, north end of road, about 150 feet west of house at end of road; iron post stamped "3049"..... 3, 043. 776

## THORP WEST UP TANEUM CREEK.

T. 18 N., R. 17 E., near center of sec. 4, intersection of road; iron post stamped "1837"..... 1, 831. 537

T. 18 N., R. 16 E., about 1,200 feet south-southwest from northeast corner of (unsurveyed), about 1,000 feet southwest of first house above Taneum Creek schoolhouse, and on south side of creek, in a clump of small pines; house is on north bank of creek; iron post stamped "2046"..... Feet. 2,040.930

## NORTHWEST UP TEANAWAY RIVER AND MIDDLE FORK.

T. 20 N., R. 16 E., in SE.  $\frac{1}{4}$  sec. 10, 15 feet west of junction of Teanaway River road with ranch road running west; iron post stamped "2127"..... 2,122.052  
Teanaway River, middle fork of, about 2.0 miles above intersection with main fork, 10 feet north of wagon road and about 600 feet southeast from a two-story log house, the first one occupied going up the river, just in edge of wood; iron post stamped "2333"..... 2,328.048

## NORTH UP NORTH FORK OF TEANAWAY RIVER.

T. 21 N., R. 16 E., sec. 32, unsurveyed, on north fork of Teanaway River road, 10 feet west of junction with ranch road running northeast and 60 feet east of top of bluff above river; iron post stamped "2376"..... 2,370.856  
Teanaway River, north fork and Second Creek, junction of, 2 miles above Beverly Creek, 125 feet east by 40 feet south of, 5 feet west of trail; iron post stamped "3361"..... 3,369.402  
Snow ranch, 8.0 miles above, opposite a high rocky bluff between the upper forks of Teanaway, on trail and 30 feet east of top of river bank, four trees blazed in vicinity; iron post stamped "4248"..... 4,243.134

## CLEALUM SOUTH 2 MILES.

T. 19 N., R. 15 E., in NW.  $\frac{1}{4}$  sec. 2, junction with road from Easton to Ellensburg, 68.5 feet west from southwest corner of a large barn and 43.5 feet north of prominent fence corner; iron post stamped "2670"..... 2,065.507

## Glacier Peak, Marblemount, Mount Baker, and Stilaguamish Quadrangles.

## SKAGIT, SNOHOMISH, AND WHATCOM COUNTIES.

The elevations in the following list were determined by primary leveling extended from tidal-gage bench marks established by the Coast and Geodetic Survey at Fairhaven and Tulalip.

The leveling was done as follows: Mount Baker quadrangle in 1907 by H. M. Hadley, in 1898 by L. D. Ryus and G. C. Jacobs; Marblemount quadrangle in 1898 by Ryus and in 1900 by E. M. Fry; Stilaguamish quadrangle in 1897 by G. H. Pratt and Fred Graff and in 1898 by Ryus; Glacier Peak quadrangle in 1897 by Pratt and John Graff and in 1898 by Ryus.

## MOUNT BAKER QUADRANGLE.

## KENDALL EAST ALONG HIGHWAY TO GLACIER.

Glacier, 1,400 feet north of station, 115 feet east of Glacier Creek bridge; iron post stamped "880 B"..... Feet. 880.725

## HAMILTON EAST ALONG GREAT NORTHERN RAILWAY.

Hamilton, in front of station; top of rail..... 93.9  
Hamilton, 4 feet south of station and 5 feet east of southwest corner of platform; iron post stamped "96 T. U. L."..... 94.719  
Birdsview, about 3.0 miles west of, south of road at south end of gravel road, in 36-inch fir tree; nail..... 130.95

Birdsview, about 1.0 mile west of, 40 feet west of bridge over Grandy Creek, south of road; iron post stamped "142 T. U. L." .....	Feet. 141. 856
Baker, about 4.5 miles west of, on bench opposite orchard on river bank, in 16-inch fir tree north of road; nail .....	210. 94
Baker, 0.25 mile west of, at bottom of hill, 40 feet north of fence corner, 50 feet north of road, in granite bowlder; copper bolt stamped "231 T. U. L." .....	230. 506
McKutchen's, 0.25 mile east of, northeast side of foothill, 30 feet north on trail, in granite rock west of trail; copper bolt stamped "207 T. U. L." ..	206. 194

**BAKER TO GRASMERE, THENCE NORTH ON WEST SIDE OF BAKER RIVER TO PARK CREEK AND TO POINT 1 MILE NORTH OF SWIFT CREEK.**

Baker, 0.25 mile west of, at bottom of hill, 40 feet north of fence corner, 50 feet north of road, in granite bowlder; copper bolt stamped "231 T. U. L." .....	230. 506
Grasmere, road crossing, 0.6 mile north of, 2 feet east of road, in base of 18-inch fir tree; nail marked "570" .....	570. 58
Vogler Lake, 1.2 miles south of, 300 feet north of summit of hill, 150 feet south of old deserted cabin, 5 feet east of road, in 2 by 2 by 2 foot granite bowlder; aluminum tablet stamped "1086" .....	1, 086. 653
Vogler Lake, surface of, June 19, 1908 .....	1, 059. 5
Frank Edgar ranch, 300 feet north of house, 5 feet west of road, at foot of cedar snag, 60 feet south of corner of secs. 14, 15, 21, and 22, in granite bowlder; aluminum tablet stamped "1085" .....	1, 084. 996
Small stream, 150 feet north of, at bend in trail, 2 feet east of trail, in base of soft maple tree 18 inches in diameter; nail marked "1075" .....	1, 075. 41
Sulphur Creek, 40 feet south of where creek is crossed by trail, at bend in trail, in base of 36-inch fir tree; nail and aluminum tag stamped "443" ..	443. 14
Sulphur Creek, 0.3 mile north of, at bend in trail, on top of bench on north side of creek, in base of 36-inch fir tree; nail marked "686". (Tree bears linen sign of south boundary of Washington Forest Reservation) .....	684. 22
Sulphur Creek, 1.2 miles north of, north of gully, on east edge of trail, in bowlder; aluminum tablet stamped "743" .....	743. 283
Sulphur Creek, 2.6 miles north of, 0.2 mile north of deep draw, 8 feet west of trail, in base of 18-inch fir tree; nail marked "733" .....	732. 86
Friday Creek, 50 feet north of, at sharp bend in trail, in base of 36-inch tall dead cedar tree; nail; marked "626" .....	625. 91
Bowlder Creek bar, south edge of, west of trail, in bowlder; aluminum tablet stamped "742" .....	742. 720
Park Creek, 0.9 mile south of, on south edge of small clearing, 200 feet south of abandoned cabin, 3 feet east of trail, in base of 36-inch fir tree; nail and aluminum tag stamped "748" and tree painted "748" .....	747. 90
Park Creek, 20 feet south of foot bridge, at junction of trails, solid rock having 1 by 1.5 feet exposed; highest point marked "761" .....	761. 32
Morovitz ranch, 300 feet north of house, 100 feet north of small stream, 50 feet south of barn, in 6 by 4 by 3 foot bowlder of igneous rock; aluminum tablet stamped "831" and rock painted .....	831. 064
Morovitz ranch, 0.7 mile north of, on open hillside, 50 feet north of small flat bench, 4 feet east of trail, small pile of rock behind bench mark rock, on embedded bowlder; highest point marked "1101" .....	1, 001. 23
Morovitz ranch, 1.9 miles north of, at place where trail comes out upon Rainbow Creek bar, in root of 48-inch fir tree; nail marked "1207" .....	1, 207. 77
Swift Creek, west side of, foot bridge, 50 feet south of point where trail crosses, in large bowlder; aluminum tablet stamped "1615" .....	1, 614. 805
Swift Creek bridge, 0.3 mile north of, east of trail, on 12 by 6 by 5 foot bowlder of igneous rock; highest point marked "1694" .....	1, 694. 54



Swift Creek footbridge, 0.8 mile north of, on upper side of where trail after crossing big slide enters grove of trees, on large gray bowlder; highest point marked "2000"..... Feet.  
1, 999. 895

BAKER NORTH BY HATCHERY TRAIL TO BAKER LAKE, THENCE WEST TO MOUTH OF PARK CREEK.

Baker, 0.2 mile west of, at bottom of hill, 40 feet north of fence corner, 50 feet north of road, in granite bowlder; copper bolt stamped "231 T. U. L."..... 230. 506  
Baker, 2.5 miles north of, on summit of low ridge, 2 feet east of road, in knuckle of base of cedar tree; nail and aluminum tag stamped "279".... 279. 38  
Baker, 5 miles north of, at summit of stiff climb and at bend in trail, east of trail, on round granite bowlder 12 inches in diameter; highest point marked "772"..... 772. 10  
T. 36 N., R. 9 E., quarter corner of secs. 18 and 19, 7 feet northwest of, in base of 24-inch fir tree; nail and aluminum tag stamped "901"..... 901. 19  
Board marked "Hatchery 10 miles," 100 feet south of, east of trail, in base of tall dead cedar tree 48 inches in diameter; nail and aluminum tag stamped "960"..... 960. 28  
United States Fish Hatchery, Baker Lake, 20 feet north of cook house, in granite bowlder 6 inches above surface of ground; aluminum tablet stamped "670"..... 670. 34  
Baker Lake, northwest corner of, where trail starts to Morovitz ranch, 15 feet from lake, 10 feet south of trail, in base of 24-inch alder tree; nail marked "666"..... 666. 52

MARBLEMOUNT QUADRANGLE.

SAUK CITY NORTHEAST ALONG HIGHWAY AND TRAIL TO PANTHER CREEK.

Kunde ranch, 400 feet north of bars to, on north side of road, in conglomerate granite rock 10 feet square, 5 feet high; copper bolt stamped "291 T. U. L."..... 291. 028  
T. 35 N., R. 10 E., northeast corner of sec. 13..... 310. 50  
Marblemount, 0.5 mile west of, 300 feet northeast of sec. 13, T. 35 N., R. 10 E., south of road, in 30-inch hemlock stump; nail..... 316. 76  
Thornton ranch, 2.0 miles west of, 100 feet north of Skagit River, north side of trail, in large granite bluff; aluminum tablet stamped "425 T. U. L."... 426. 548  
Davis ranch, 3.0 miles west of, 50 feet south of Hanging Rock camping place, 100 feet north of Skagit River, in slanting rock wall; aluminum tablet stamped "842 T. U. L."..... 743. 376  
Ruby Creek mining camp at mouth of, 10 feet north of cook house, 20 feet east of blacksmith shop, in large bowlder; aluminum tablet stamped "1372 T. U. L."..... 1, 274. 091  
Panther Creek, at mouth of; surface of water..... 1, 644. 5

MARBLEMOUNT EAST ALONG HIGHWAY 16 MILES.<sup>1</sup>

Marblemount, forks of main road and Ruby Creek trail, 200 feet west of hotel, in 42-inch fir stump at junction; nail..... 322. 37  
Skagit River at ferry; water surface..... 300. 4  
Marblemount post office, 10 feet west of blacksmith shop, 60 feet east of river, in 54-inch cedar stump; nail..... 312. 43  
Marblemount, 2.1 miles east of, 50 feet north of road, 200 feet east of gravel slide, in granite rock 7 feet square, 4 feet high; copper bolt stamped "410 T. U. L."..... 409. 303  
Marblemount, 7.0 miles east of, 200 feet east of bridge over gulch, south of road, in 36-inch fir tree; nail..... 801. 04

<sup>1</sup> This line closes 3 feet low and is unadjusted.

	Feet.
Marble Creek at ford; water surface.....	977. 9
Marblemount, 11.0 miles east of, west end of corduroy and 4 feet above fork road to north, in 42-inch cedar stump; nail.....	1, 030. 31
Hurd house, 150 feet north of, in granite rock 4 feet high, 10 feet north of road; copper bolt stamped "1057 T. U. L.".....	1, 055. 35
Marblemount, 14.0 miles east of, 30 feet east of small bridge, south of road, in 54-inch cedar tree; nail.....	1, 047. 02
Marblemount, 16 miles east of, 50 feet above river, south of trail, in 36-inch cedar tree; nail.....	1, 202. 86

## STILAGUAMISH QUADRANGLE.

HARTFORD JUNCTION NORTHEAST ALONG NORTHERN PACIFIC RAILWAY TO GRANITE FALLS,  
THENCE NORTHWEST ALONG HIGHWAY TO ARLINGTON.

Granite Falls, 600 feet west of station, south side of track and north of wagon road, in V formed by road and track, crossing; iron post stamped "Prim. Trav. Sta. No. 6, 386 WASH 1909" .....	385. 120
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POINT NEAR SILVERTON ALONG EVERETT & MONTE CRISTO RAILWAY AND DOWN SAUK RIVER  
TO GRANITE FALLS.

Bridge 42, Perry Creek, 120 feet west of, on south side of track; on hemlock stump 24 inches in diameter.....	1, 748. 28
Bridge 37, 25 feet east of west end of, on larch stump 36 inches in diameter. ....	1, 645. 92
Bed of South Fork of Stilaguamish River, opposite bridge 37 .....	1, 630
Milepost 30, 670 feet west of, 15 feet south of track, on hemlock stump 4 feet in diameter.....	1, 574. 34
Forty-five Mining Co.'s ore house, 450 feet east of, 15 feet north of center of track; on cedar stump 5 feet in diameter.....	1, 478. 14
Silverton, 1,000 feet east of water tank, 210 feet east of milepost 29, 20 feet north of track, in granite boulder 6 by 6 by 6 feet; copper bolt stamped "1521" .....	1, 522. 84
Milepost 28, about 1,800 feet west of, south side of track, on hemlock stump 36 inches in diameter.....	1, 437. 10
Milepost 27, about 1,850 feet west of, on north side of track, on hemlock 36 inches in diameter.....	1, 385. 13
Stilaguamish River, third crossing of, 210 feet west of bridge 30, south of track, on a spruce stump 4 feet in diameter.....	1, 281. 22
Boardman Creek, about 2,200 feet east of west end of bridge 29 over, in T. 30 N., R. 9 E., probably sec. 20, 40 feet south of railroad, on west end of ledge which rises up some 40 feet above track, bench mark is 4 feet higher than track; copper bolt stamped "1247" .....	1, 248. 483
Mud Tunnel, 400 feet northwest of west end of, on hemlock 36 inches in diameter, 20 feet west of track.....	1, 179. 04
Bridge 23, 120 feet west of, on hemlock stump 18 inches in diameter, south side of track.....	1, 063. 99
Bridge 19, 1,050 feet west of, north side of track, on hemlock stump 18 inches in diameter.....	945. 83
Bridge 17, 250 feet west of, in T. 30 N., R. 8 E., about 400 feet east of section line between secs. 7 and 8, 15 feet south of Everett & Monte Cristo track, in a 6-foot cut; copper bolt in slate rock stamped "897" .....	898. 584
Bridge 15, 250 feet east of, 20 feet south of track, on hemlock stump 4 feet in diameter.....	866. 90
Tunnel 5, east portal of; top of rail.....	787. 3

	Feet.
Tunnel 4, east portal of; top of south rail.....	764. 6
Tunnel 3, east portal of; top of south rail.....	745. 1
Tunnel 2, west portal of; top of tie at.....	621. 5
Tunnel 2, 600 feet west of, north of track, on fir stump 24 inches in diameter.....	605. 4
Milepost 9, 20 feet west of, on opposite side of track from, in side of solid rock cut about the middle of ten degree curve to the right, 10 feet south of center of track; copper bolt stamped "460".....	461. 031
Blackman spur, 470 feet west of head block, 15 feet north of track, on hemlock stump 30 inches in diameter.....	440. 17
Granite Falls, 350 feet west of station, 40 feet south of track, on first ridge west of station; iron post stamped "397".....	397. 806

SILVERTON SOUTH ALONG TRAIL OVER DIVIDE TO WILLIAMSON CREEK, THENCE DOWN CREEK TO SULTAN RIVER.

Forty-five Mining Co.'s tram, 40 feet south of the fifth mast, on hemlock stump 36 inches in diameter, beside trail.....	1, 877. 05
Forty-five Mining Co.'s tram, 40 feet southwest of the ninth mast, on larch stump 24 inches in diameter, on trail.....	2, 361. 53
First loop in trail cut out of solid rock, 50 feet below, 50 feet below tram, 10 feet below trail, on hemlock stump 20 inches in diameter.....	2, 330. 44
Second loop in trail cut out of solid rock, on hemlock 20 inches in diameter, where trail begins to descend.....	3, 377. 32
Michigan Gulch, 25 yards south of tram, 10 feet north of trail, on larch 36 inches in diameter.....	3, 573. 42
Summit, 5 feet west of mast on tram, on larch stump 36 inches in diameter.....	4, 177. 07
Summit, about 0.5 mile south of, on larch 30 inches in diameter on south side of trail.....	3, 514. 59
Adelaide Gulch, near intersection of two small streams, on hemlock 12 inches in diameter on south side of trail.....	3, 019. 13
Forty-five Mining Co.'s sawmill, 80 feet east of, on larch stump above skid road.....	2, 582. 97
Williamson Creek, intersection of trail with right bank of, on larch 24 inches in diameter.....	1, 903. 89
Log cabin, 850 feet south of, on east side of trail, on larch 36 inches in diameter.....	1, 813. 05
T. 29 N., R. 10 E., probably in sec. 7, 200 feet south of small creek, in detached rock 10 by 10 by 5 feet; copper bolt stamped "1688".....	1, 689. 93

GRANITE FALLS SOUTHEAST ALONG HIGHWAY TO LAKE ROESIGER.

Granite Falls, 350 feet west of station, 40 feet south of track, on first ridge of solid land west of station; iron post stamped "397".....	397. 806
Granite Falls, 1,200 feet east of, on 18-inch fir on right of road.....	398. 12
Kerren's, across bridge opposite, 5-foot cedar stump, left of road.....	440. 57
Whetmore's slashing, 1,000 feet south of, on root of cedar stump, right of road.....	511. 87
Swamp, 150 feet beyond bridge over, left of road; on 18-inch hemlock....	497. 31
Menzel Lake, opposite middle of, on hemlock stump right of road.....	505. 75
Henry Menzel house, on 2-foot hemlock stump opposite, left of road.....	540. 58
Chowndings, 1,250 feet north of, in clearing, on 18-inch hemlock left of road.....	461. 80
Barstow house, 40 feet north of, near trail cutting across to Lake Roesiger wagon road; on 18-inch hemlock stump.....	524. 30
Barstow house, 1,000 feet southeast of, on 3-foot hemlock left of trail.....	639. 04
Lake Roesiger road, 800 feet south of house; on 12-inch hemlock left of road.....	733. 49

## CHOWNDINGS ALONG HIGHWAY TO KELLEY RANCH.

	Feet.
Chowndings, 1,500 feet beyond, on 24-inch hemlock left of road.....	486.75
Schoolhouse, 800 feet beyond, on 30-inch hemlock stump right of road....	491.42
Russell house, 500 feet west of, on 24-inch hemlock stump right of road....	504.95
Law house, 1,200 feet west of, on 36-inch hemlock stump right of road....	549.92
Crow house, 100 feet north of, on 36-inch hemlock stump in Crow's field..	562
Summit of divide, on 5-foot cedar snag on right of trail .....	740.32
Feemster house, 200 feet northwest of, on 5-foot cedar left of trail.....	639.83
Kelley house, 1,200 feet west of, on 36-inch cedar near creek right of trail..	664.93
Kelley house, 1,250 feet east of, on 18-inch hemlock 15 feet left of trail...	708.43
Kelley house, 1,750 feet east of, on boulder on side of hill 25 feet to left of trail and 275 feet from Pilchuck River; copper bolt stamped "746"....	747.500

## GRANITE FALLS NORTHEAST ALONG HIGHWAY TO CANYON CREEK.

Granite Falls, 0.5 mile northeast of, northwest side of road, 8 feet from fence, 75 feet from gate to house, in twin fir stump; nail.....	440.27
Granite Falls, 1.0 mile northeast of, in 76-inch cedar stump 10 feet high and east of road at curve; nail.....	454.24
Granite Falls, 1.5 miles northeast of, east side of road at bend, very prominent 20-inch hemlock tree; nail.....	388.25
Stilaguamish River, south fork, bridge over, 100 feet southwest of, northwest side of road, in 20-inch hemlock tree; nail.....	362.73
Stilaguamish River, south fork, 0.5 mile northeast of, southeast side of road, in 20-inch fir stump 4 feet high; nail.....	460.68
Stilaguamish River, south fork, 1.0 mile northeast of, northwest of road, top of ridge; in 24-inch hemlock tree; nail.....	568.47
Canyon Creek, foot bridge, at junction of trail to with road.....	523.9
Stilaguamish River, south fork, bridge over, 1.25 miles northeast of, 150 feet from Canyon Creek, north of road on hillside, in 36-inch fir tree; nail..	446.35
Canyon Creek, 150 feet west of house, at mouth of small stream from north..	430.52
Canyon Creek, 0.25 mile north of east side of trail, on first bench, in 34-inch fir stump; nail .....	479.16
T. 31 N., R. 7 E., south quarter corner of sec. 32, 125 feet northeast of, in rock projecting 2.5 feet out of hill; copper bolt stamped "545 M. C."..	547.725

## BARLOW PASS ALONG HIGHWAY DOWN SAUK RIVER TO DARRINGTON, THENCE WEST ALONG NORTHERN PACIFIC RAILWAY TO BRIDGE OVER STILAGUAMISH RIVER.

Raucher cabin, 600 feet north of, T. 31 N., R. 10 E., 0.5 mile southeast of meander corner between secs. 4 and 9, on cedar 18 inches in diameter on west of road .....	732.59
Meander corner between secs. 4 and 9, 300 feet north (along road) of, T. 31 N., R. 10 E., in cedar 12 inches in diameter, on west of road, about 40 feet from river.....	710.98
Milepost 12, about 1,000 feet south of, 150 feet north of bench of land 20 feet higher than bench mark, on west of road, on hemlock 30 inches in diameter.....	689.56
Milepost 11, about 1,800 feet southeast of, 100 feet north of short ascent 12 feet high to bench of land, 30 feet from river bank, on cottonwood 28 inches in diameter, on west of road.....	662.05
Milepost 11, about 250 feet northwest of, 200 feet north (along road) of log cabin, on fir 24 inches in diameter, west of road.....	646.35
Clear Creek, 50 feet east of, at point about 150 feet above its mouth, 50 feet south of a log cabin, in ledge on south of road; copper bolt stamped "625" ..	626.940

Clear Creek, about 4,500 feet northwest of, about 1,200 feet (along road) north of first clearing north of Clear Creek, on cedar 30 inches in diameter on east of road.....	Feet. 593. 57
Milepost 8, about 1,500 feet north of, on fir 12 inches in diameter on west of road.....	575. 87
Emmons house, 100 feet northwest of, at junction of road down Sauk River with road to Darrington post office, on fir 18 inches in diameter.....	566. 92
Stilaguamish River, junction of Sauk River road with road down, 58 feet west of Sauk River road and 20 feet south of Stillaguamish road, in fir tree 28 inches in diameter; nail.....	556. 88
Stilaguamish River, junction of Sauk River road with road down, 0.25 mile west of, north of road, on cedar 8 inches in diameter.....	545. 28
Milepost 6, 500 feet west of, 140 feet west of point where road makes a sharp turn to west, on hemlock 15 inches in diameter.....	532. 25
Darrington "burn," on west side of, sec. 9, T. 32 N., R. 9 E., 10 feet north of trail, halfway down the slope between bench and bottom land, slope faces south, a log barn on Squire Creek bottom bears south-southeast about 600 feet distant, in granite boulder 3.5 by 2.5 by 1 feet, above ground; copper bolt stamped "496".....	498. 161
James Smith ranch, by bars across trail leading to, 150 feet west of Squire Creek; on cedar 8 inches in diameter.....	456. 88
W. Spoerhase ranch, opposite gate entrance to, on cedar 36 inches in diameter.....	454. 69
T. 32 N., R. 8 E., secs. 12 and 13, 100 feet west of quarter corner between, north side of trail, on hemlock 20 inches in diameter.....	454. 66
T. 32 N., R. 9 E., 20 feet northwest of corner to secs. 11, 12, 13, and 14, on cedar 18 inches in diameter, which is the northwest bearing tree of corner.....	467. 06
Cavanaugh's trail, point of branching, on cedar stump 18 inches in diameter on north side of trail.....	429. 69
Boulder Creek, top of descent toward, 80 feet east of, on hemlock 14 inches in diameter on west edge of bench.....	412
Joe Pott's clearing, sec. 8, T. 32 N., R. 8 E., on trail to, and about 700 or 800 feet southwest of cabin, about 2,000 feet northerly from main trail down Stilaguamish River, on south side of dry watercourse bearing east and west; in rock 3.5 by 2.5 by 1.5 feet above ground; copper bolt stamped "303".....	305. 328
T. 32 N., R. 8 E., quarter corner between secs. 7 and 8, 150 feet west of creek in ravine, south of trail, on cedar 4 feet in diameter.....	374. 14
Milepost 1, 40 feet west of, north side of trail; on cedar 4 feet in diameter..	371. 79
T. 32 N., R. 7 E., quarter corner between secs. 11 and 12, about 0.5 mile east on left bank of north fork of Stilaguamish River, on south side of trail; top of low bluff; on cedar 36 inches in diameter.....	299. 90
T. 32 N., R. 7 E., about 600 feet southeast of quarter section corner between secs. 11 and 12, 15 feet north of abandoned road which branches off from the new wagon road about 200 feet northeast, in slashing 30 feet north of steep descent to North Fork of Stilaguamish River, about 50 feet below, on north slope of rock 6.5 feet long and 2.5 feet wide, roof-shaped; copper bolt stamped "286".....	288. 100
N. C. Hollingsworth house, about 1.9 miles west of, 40 feet east of junction of old and new roads, in root of 24-inch cottonwood tree north side of road; nail.....	206. 14
Four-mile post, about 300 feet east of, top of hill, in 20-inch fir tree on north side of road; nail.....	274. 21

## DARRINGTON NORTH ALONG HIGHWAY TO M'KUTCHENS.

Darrington, 4.0 miles north of, east of road, opposite bars; in 36-inch cedar tree; nail.....	Feet. 478. 61
Darrington, 5.0 miles north of, in fir tree on west side of road at top of hill; nail.....	455. 29
Darrington, 7.5 miles north of, 200 feet north of corduroy bridge over swamp, in 42-inch cedar tree on east side of road; nail.....	397. 77
Suiattle River, 0.25 mile south of mouth of, 8.5 miles north of Darrington, in ledge of granite and slate 15 feet above and 15 feet west of road, in cut of hill; copper bolt stamped "414 M. C.".....	415. 813
Darrington, 14.5 miles north of, 10 feet west of road and south of west of island in Sauk River, in rocky bluff 10 feet high, 40 feet above river; copper bolt stamped "333 M. C.".....	335. 358
Darrington, 18.5 miles north of, south edge of clearing, 200 feet northeast of barn, east of road, in cottonwood tree; nail.....	256. 86
Sauk, 3.5 miles south of, 50 feet from northeast corner of Phillips's fence, 50 feet from slough, west of road, in 80-inch charred cedar tree; nail....	251. 00
Sauk, 2.0 miles south of, north of gate of fork roads to east, about 1,000 feet northwest of bridge over small stream, in sandstone ledge 12 feet west of road; copper bolt stamped "246 M. C.".....	247. 949
Skagit River, Sauk Ferry, about mean height of river.....	202. 2

## M'MURRAY EAST ALONG HIGHWAY AND TRAIL TO LAKE CAVANAUGH, THENCE NORTH VIA DAY LAKE TO LYMAN FERRY (PORTION OF LINE).

Deer Creek trail, 5.0 miles from Lake Cavanaugh road, 3 feet south of southwest corner of reflectors, 4 feet north of trail; iron post stamped "1260 WASH 1909".....	1, 260. 590
T. 33 N., Rs. 6 and 7 E., quarter corner between secs. 12 and 7, crossing of range line and Deer Creek trail, in root of tree; copper temporary bench mark.....	1, 294. 19
Deer Creek trail, 100 feet west of junction of trail to Day Lake, 7.2 miles from Lake Cavanaugh Road, 15 feet east of stream, 6 feet west of 8-foot cedar, top of large boulder; aluminum tablet stamped "1147 WASH 1909".....	1, 146. 497
Deer Creek trail, 0.2 mile north of, on trail to Day Lake, 43 paces east to corner of secs. 5, 6, 7, and 8, east side of trail, in root of tree blazed and marked with pencil "43 paces east to cor. secs. 5, 6, 7, and 8"; copper temporary bench mark.....	1, 471. 87
Tps. 33 and 34 N., R. 7 E., 60 rods east of corner of secs. 5, 6, 31, and 32, crossing of trail from Deer Creek to Day Lake with township line, east edge of trail; in 8-inch tree blazed and marked with pencil, copper temporary bench mark.....	1, 710. 38
Day Lake, east end of, fork of trail, in tree blazed and marked in pencil "Deer Creek, keep to right"; copper temporary bench mark.....	1, 627. 21
Day Lake, surface of water.....	1, 599. 55
Day Lake, north side of, about one-third of the distance from east and west end, 250 feet west of cabin, 15 feet west of small stream; in top of large boulder; aluminum tablet stamped "1616 WASH 1909".....	1, 615. 325
Day Lake, 1.8 miles northwest of, at summit of hill, 150 feet northwest of cabin, just west of 8-foot cedar, east edge of trail; in top of granite boulder; aluminum tablet stamped "2339 WASH 1909".....	2, 338. 314
Day Lake, 3.5 miles northwest of, 20 feet west of cabin, east edge of trail, in root of stump; copper temporary bench mark.....	1, 971. 64

Day Lake, 3.7 miles northwest of, 7.5 miles southeast of Lyman, 15 feet north of stream, 40-foot waterfall about 70 feet to east, east edge of trail, top of rock about 3 feet high; aluminum tablet stamped "2005 WASH 1909" .....	Feet. 2, 004. 959
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## GLACIER PEAK QUADRANGLE.

## MONTE CRISTO ALONG EVERETT &amp; MONTE CRISTO RAILWAY TO POINT NEAR SILVERTON.

Sauk River bridge, 60 feet west of west end of, 30 feet south of center of track, on hemlock stump 26 inches in diameter.....	2, 302. 12
Barlow Pass station, about 0.5 mile east of, 30 feet north of center of track, on hemlock stump with wide-spreading roots.....	2, 312. 71
Barlow Pass station, 12 feet east of, 12 feet north of center of track, on 30-inch larch stump.....	2, 346. 60
Barlow Pass, about 4,200 feet west of, near point of 5° curve left, 15 feet south of center of track, on 24-inch hemlock stump.....	2, 242. 38
Milepost 36, 400 feet west of, 15 feet south of track, on 30-inch hemlock stump.....	2, 203. 85
Milepost 34, 350 feet west of, on 36-inch hemlock stump.....	1, 927. 77

## BARLOW PASS ALONG HIGHWAY DOWN SAUK RIVER TO DARRINGTON.

Barlow Pass station, about 0.25 mile northeast of, 10 feet east of wagon road, 150 feet north of long puncheon incline on road, on hemlock 10 inches in diameter.....	2, 249. 64
Barlow Pass station, about 0.5 mile northeast of, on root of double hemlock 24 inches and 30 inches in diameter, 15 feet west of wagon road, at station 37 plus 50 on Goat Lake electric line survey.....	2, 220. 64
Sauk River, junction of road from Barlow Pass with road along, on 28-inch hemlock.....	2, 202. 54
Sauk River, junction of road from Barlow Pass with road along, about 1,600 feet north of, on west edge of wagon road, on hemlock 20 inches in diameter.....	2, 192. 62
County road milepost 29, about 800 feet south of, on west edge of road, on 30-inch hemlock.....	2, 156. 08
County road milepost 29, about 1,100 feet north of, west side of wagon road at point where creek 10 feet wide first touches road on east; on 30-inch hemlock.....	2, 029. 80
Goat Lake wagon road, intersection with Sauk River road; on 5-foot cedar..	1, 953. 97
Goat Lake wagon road, intersection with Sauk River road, about 1,800 feet north of, 150 feet south of old bridge site, west side of road on 24-inch hemlock.....	1, 810. 28
Elliott Creek, about 200 feet north of mouth of, 80 feet north of bridge site, on east side of road; on 36-inch hemlock.....	1, 698. 86
Elliott Creek, about 750 feet north of mouth of, 150 feet north of narrow strip of bottom land near foot of rise in road, 15 feet west of road; on 20-inch larch.....	1, 645. 34
Elliott Creek, about 1.0 mile north of, west side of road, top of steep hill sloping north; on hemlock 48 inches in diameter.....	1, 578. 61
Milepost 25, about 1.0 mile south of, 30 feet east of right bank of river, 10 feet west of road; on 36-inch cedar.....	1, 498. 39
Milepost 25, 50 feet north of, creek crosses by bridge about 12 feet above water, 5 feet west of road; on 15-inch alder.....	1, 370. 70
Orient, at junction of north-south forks of Sauk River, about 140 feet south-east of meander corner on southwest bank of north fork, meander corner is on section line between secs. 9 and 16, T. 30 N., R. 11 E., in granite boulder 4 by 6 by 2.5 feet above ground; copper bolt stamped "1241"....	1, 243. 31

Milepost 23, about 1,080 feet north of, about one-third of distance up the second hill of "pitch" after passing creek; west side of road; on 30-inch cedar.....	Feet. 1, 193. 35
Milepost 22, about 700 feet south of, 75 feet south of bridge across small creek on south side of clearing, east side of road; on granite boulder....	1, 161. 54
Milepost 22, about 3,350 feet north of, 150 feet north of cabin between road and river, east side of road; on hemlock 36 inches in diameter.....	1, 098. 96
Milepost 21, about 20 feet north of, west side of road; on 36-inch cedar....	1, 077. 34
T. 31 N., R. 11 E., secs. 29, 30, 31, and 32, on bearing tree for corner to, west side of road; 4-foot cedar.....	1, 035. 44
Pugh ranch, 500 feet north of, west side of road, on 5-foot cedar.....	1, 023. 13
T. 31 N., R. 11 E., about 1,500 feet from corner of secs. 29, 30, 31, and 32, left bank of Sauk River, 20 feet northeast of pool at foot of fall on Falls Creek 150 feet above its mouth; in ledge; copper bolt stamped "1039".....	1, 040. 488
Snover cabin, about 660 feet north of, on east of road; on hemlock 30 inches in diameter.....	980. 81
McClellan ranch, 2,400 feet northwest of, 10 feet west of road, on 5-foot cedar.....	940. 95
T. 31 N., R. 10 E., between secs. 14 and 15, 100 yards northwest of Duber cabin, about 220 feet southeast of meander corner on west bank of Sauk River, 10 feet west of road, in blue ledge; copper bolt stamped "838"....	839. 982
Bordens Creek, 50 feet north of, on west of road, on 15-inch hemlock.....	815. 42

## MONTE CRISTO LAKE SOUTHEAST ALONG HIGHWAY TO GOAT LAKE.

Elliott Creek, bed of, at road crossing.....	1, 797
Goat Lake, 61 feet north of Coffin log house, 12 feet northeast of Goat Lake road, and about 60 feet northeast of Elliott Creek, in rock in place; copper bolt stamped "3162".....	3, 165. 579
Goat Lake, surface of water.....	3, 155. 6

MARBLEMOUNT EAST ALONG HIGHWAY TO CASCADE PASS.<sup>1</sup>

Mineral Park, 150 feet north of east end of bridge over North Fork, 30 feet east of trail, 50 feet northeast of dugout root house, in granite rock in bank 3.5 feet high, projecting 3 feet from earth; copper bolt stamped "1396 T. U. L.".....	1, 394. 978
Mineral Park, 2.5 miles northeast of, north bank of North Fork, 50 feet from old bridge, north of trail, in hemlock tree; nail.....	2, 038. 07
Gilbert cabin, 2.5 miles east of, 100 feet east of rock slide, north of trail; marked cross on sharp point at lower end of granite rock on grassy slope....	4, 947. 91
Cascade summit; iron post stamped "5423." (This post was set in 1897 and the elevation as stamped was based upon an assumed datum at Chelan Falls on Columbia River) .....	5, 390. 457

## Mazama, Methow, Slate Pass, and Stehekin Quadrangles.

## CHELAN, OKANOGAN, AND WHATCOM COUNTIES.

The elevations in the following list were determined by primary leveling extended from tidal gages at Tulalip and Fairhaven and from the precise-level line of the Coast and Geodetic Survey along the Northern Pacific Railway. The double-run line in the Slate Pass quadrangle from Harts Pass to the International Boundary was by the United States and Canada Boundary Survey.

<sup>1</sup> This line closes 3 feet low and is unadjusted.



The leveling was done as follows: Stehekin quadrangle in 1897 by P. F. Byrne, in 1899 by E. M. Fry, and in 1901 by C. E. Hill; Slate Pass quadrangle in 1899, 1900, and 1901 by Fry, in 1904 by Thomas Riggs, and in 1905 by George Newman; Methow quadrangle in 1899 and 1902 by Fry; and Mazama quadrangle in 1899 by Fry.

## SLATE PASS QUADRANGLE.

## PANTHER CREEK EAST ALONG TRAIL TO SLATE CREEK PASS.

	Feet.
Canyon Creek, 300 feet east of bridge over, 0.5 mile from mouth of, on north side and 30 feet from creek, 400 feet north of house of Old Channel Hydraulic Co., in rock bluff; aluminum tablet stamped.....	1, 899. 720
Mill Creek, mouth of, 200 feet northwest of cabin near, 250 feet north of Canyon Creek, in rock wall near old placer diggings; aluminum tablet..	2, 440. 520
Slate Creek, 500 feet north of mouth of, 100 feet east of Smoky Cabin, 100 feet east of trail, in large boulder; aluminum tablet.....	2, 838. 759
Slate Creek camp, 1.5 miles southeast of, junction of Slate Creek and Benson Creek trail; top of boulder; marked "4877".....	4, 805. 41
Slate Creek Pass, at summit between Trout and Slate Creeks, in large stone 10 feet south of trail; aluminum bolt stamped "6197".....	6, 197. 563

## SLATE CREEK OR HARTS PASS SOUTHWEST ALONG TRAIL TO BARRON, THENCE TO WINDY PASS AND RETURN TO HARTS PASS.

Harts Pass (Slate Creek Pass), on trail at summit, between Trout and Slate Creeks, in top of boulder; aluminum bolt stamped "6197".....	6, 197. 563
Harts Pass, 0.7 mile southwest of, at creek crossing road, in root of twin trees; spike.....	5, 789. 999
Harts Pass, 1.3 miles southwest of, point on rock at creek crossing road about 2 miles south of Barron.....	5, 129. 30
Harts Pass, 1.7 miles southwest of, in root of spruce tree on north bank of road; spike.....	5, 073. 03
Barron, 75 feet from, 2.0 miles southwest of Harts Pass, on north edge at junction of Barron and Slate Creek roads, point on conical-shaped rock..	4, 806. 04
Barron, 6 feet west of road, 3 feet west of post office, in store of Methow Trading Co. (now Simon Veasy), 150 feet east of Skagit River Hotel; iron post stamped "5353 TUL".....	5, 353. 126
Barron, 0.5 mile north of, in west side of tamarack stump 50 feet west of road; nail.....	5, 843. 98
Barron, 3.9 miles north of, west side of road, in balsam stump; nail head..	5, 994. 88
Barron, 1.5 miles north of, 100 feet north of Sky trail, 300 feet east of Barron trail, in Windy Pass, in top of largest boulder in lowest part of saddle on divide between Pasayton River and north fork of Slate Creek; bronze tablet stamped "6262 TUL".....	6, 262. 250
Harts Pass, 4.5 miles northwest of, on small knoll in middle of pass between a fork of Slate Creek and Pasayton River, 100 feet north of trail; iron post stamped "6575 TUL".....	6, 575. 487
Harts Pass, 4.0 miles northwest of, 3 feet to left of trail, in pass between Pasayton River and fork of Slate Creek, in root of small tamarack tree; nail.....	6, 703. 283
Harts Pass, 2.8 miles northwest of, painted rock 4 feet below trail.....	6, 987. 69
Harts Pass, 1.5 miles northwest of, near top of bench coming up from valley; on boulder.....	6, 770. 97
Harts Pass, 0.5 mile northwest of, on high trail from pass; on boulder.....	6, 411. 62

WINDY PASS NORTHEAST ALONG TRAIL TO PASAYTON RIVER, THENCE NORTH DOWN RIVER TO  
INTERNATIONAL BOUNDARY LINE.

Windy Pass, 0.6 mile northeast of, 4 feet from trail, in root of leaning spruce tree; head of spike.....	Feet. 5,780.35
Windy Pass, 1.3 miles northeast of, 20-penny spike in root of spruce tree 20 feet from creek.....	5,388.22
Windy Pass, 2.1 miles northeast of, 50 feet from trail, in large spruce tree up east fork of Pasayton River; spike.....	5,097.48
Windy Pass, 3.6 miles northeast of, on west bank of river below small flat on west side and above slide on west side of river; in large rock; aluminum tablet stamped "4928 TUL".....	4,928.236
La Roche cabin, 2.8 miles south of, west bank of river, 75 feet north of first tributary on west, in root of balsam tree; spike.....	4,904.49
La Roche cabin, 0.8 mile south of, in root of spruce tree; spike.....	4,788.51
La Roche cabin, 70 feet from, 10 feet from both trails at forks of new and old trails; iron post stamped "4767 TUL".....	4,766.977
La Roche cabin, 0.5 mile north of, 20 feet west of trail, east side of river; corner of large boulder.....	4,706.21
La Roche cabin, 1.3 miles north of, west side of river; point on boulder...	4,647.55
Pasayton River, on west bank of river just above falls, 70 feet west of trail to Barron, in rock; aluminum tablet stamped "4632 TUL".....	4,631.568
La Roche cabin, 2.25 miles north of, ring of paint around point of rock....	4,554.00
La Roche cabin, 3.0 miles north of, 20 feet from west bank of river, in root of balsam tree; spike.....	4,506.60
La Roche cabin, 4.0 miles north of, east bank of river below a goose neck of same; in root of spruce tree; spike.....	4,454.99
La Roche cabin, 4.5 miles north of, 100 feet south of where trail crosses river, on east bank; iron post stamped "4443 TUL".....	4,443.453
La Roche cabin, 5.3 miles north of, on west side of river, 11.0 miles south of international boundary; ring of paint around rock.....	4,373.65
International boundary, 8.6 miles south of, on west side of river, 5 feet just around bend to south of Robinson's upper cabin, in root of dry pine; spike.	4,204.331
International boundary, 8.2 miles south of, on west bank of river, in knuckle of balsam tree; spike.....	4,178.74
International boundary, 6.7 miles south of, 50 feet east of river; point on large boulder.....	4,092.74
International Boundary, 5.9 miles south of, 150 feet south of small creek, on west side of river 50 feet distant and 12 feet higher; iron post stamped "4052 TUL".....	4,051.786
International boundary, 3.5 miles south of, on east side of river, on gravel bar; point on large boulder.....	3,998.20
International boundary, 2.1 miles south of, west bank of river, in root of balsam tree; spike.....	3,943.78
International boundary, 1.5 miles south of, in forks of Barron and Boundary trail, in base of pine tree; spike.....	3,963.69
International boundary, 1.0 mile south of, west side of trail, in root of spruce tree; spike.....	3,912.87
International boundary, 0.5 mile south of, west side of trail, in root of pole pine stump; nail.....	3,879.93
Vista on international boundary, 10 feet east of trail, in root of tree; head of nail.....	3,851.95
International boundary, 300 feet east of Pasayton River, 10 feet east of trail; iron post stamped "3853 TUL".....	3,852.854

## WINTHROP NORTHWEST ALONG HIGHWAY AND TRAIL TO SLATE PASS (PORTION OF LINE).

Robinson Creek, 3.0 miles south of, 400 feet north of milepost 3, in root of 12-inch pine tree; nail.....	Feet. 2, 374. 56
Robinson Creek, 2.0 miles south of, 5 feet west of milepost 2; top of stone.....	2, 427. 37
Robinson Creek, 4 feet east of southeast corner of Methow Trading Co.'s warehouse, in stone; aluminum bolt stamped "2521 T".....	2, 521. 528
Robinson Creek, 2.5 miles north of, north side of trail; on top of stone.....	2, 713. 47
Slate Creek Pass, summit of, 10 feet south of trail, 4.0 miles south of Slate Creek camp, in top of large stone; bolt.....	6, 197. 56

## MAZAMA QUADRANGLE.

## WINTHROP NORTHWEST ALONG HIGHWAY AND TRAIL TO SLATE CREEK PASS (PORTION OF LINE).

Milepost 8, about 3,000 feet west of, 27 feet northwest of a fir tree and 30 feet south of a fir tree, 5 feet south of road, in stone; aluminum bolt stamped "2165 T".....	2, 165. 521
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## METHOW QUADRANGLE.

## YEOMAN RANCH NORTHWEST ALONG HIGHWAY VIA METHOW TO TWISP.

Methow post office, at southeast corner of Bolinger's store, 10 feet west of State road; iron post stamped "1158 T".....	1, 157. 912
McFarland Creek, 100 feet east of, east side of road; top of large boulder.....	1, 253. 64
Gold Creek, 1,000 feet north of, east side of road; top of stone.....	1, 324. 13
Peterson ranch, 300 feet south of gate and 300 feet southwest of barn; on top of stone.....	1, 358. 83
T. 32 N., R. 22 E., NW. $\frac{1}{4}$ sec. 29, 100 feet west of house at Ferris ranch, 250 feet northeast of barn, east side of road; iron post stamped "1452 T".....	1, 452. 299
Ferris ranch, 2.0 miles north of, 50 feet east of road, 1,000 feet west of Methow River; on top of stone.....	1, 483. 41
Ferris ranch, 3.0 miles north of, 150 feet west of road, at point 1,000 feet north of north end of lane; on top of stone.....	1, 546. 38
Alder Creek crossing, 0.25 mile south of, 10 feet west of road, in root of pine tree; nail.....	1, 810. 40
Cushing ranch, 150 feet northwest of house, 10 feet east of road; on top of stone.....	1, 826. 39
Twisp, 2.0 miles south of, on east side of road at north end of small lake; on top of stone.....	1, 807. 08
Twisp, at northeast corner of Caldwell's blacksmith shop, 300 feet southwest of post office; iron post stamped "1619 T".....	1, 618. 868

## TWISP WEST ALONG HIGHWAY UP TWISP RIVER AND DOWN BEAVER CREEK TO MOUTH (PORTION OF LINE).

Twisp, 1.5 miles west of, 100 feet north of north end of bridge over Twisp River, in top of stump; nail.....	1, 666. 45
Elbow Coulee, mouth of, 10 feet north of road at S. M. Newby ranch; iron post stamped "1994 T".....	1, 994. 045
Newby ranch, 1.0 mile west of, 4 feet south of road, at foot of pine tree; on top of boulder.....	2, 025. 35
Newby ranch, 2.0 miles west of, 10 feet south of road; on top of stone.....	2, 091. 80
Newby ranch, 4.5 miles west of, 500 feet north of cabin, on north side of road, in root of 12-inch tree; nail.....	2, 221. 49
Old Scaffold camp ground, at south side of road; iron post stamped "2329 T".....	2, 328. 957

Old Scaffold camp ground, 1.0 mile west of, at south side of road; on top of stone.....	Feet. 2,396.25
War Creek, 1.0 mile west of mouth of, in center of road; on top of stone...	2,459.73
War Creek, 3.0 miles west of mouth of, 20 feet south of road at foot of pine tree; on top of stone.....	2,667.63
War Creek, 4.0 miles west of mouth of, in top of stump in center of road; nail.....	2,799.11
Gilbert camp, 8.0 miles east of, 10 feet south of road; iron post stamped "2806 T" .....	2,806.110

## TWISP NORTH ALONG STATE ROAD TO WINTHROP.

T. 34 N., R. 21 E., sec. 25, 4.0 miles north of Twisp, 200 feet south of Hartle ranch house, 150 feet west of road; iron post stamped "1688 T" .....	1,687.903
Twisp, 6.0 miles north of, 50 feet west of road; on top of stone .....	1,750.20
Twisp, 7.0 miles north of, 100 feet east of road; on top of stone .....	1,747.07
Winthrop, 0.5 mile west of, south side of road; on stone .....	1,803.45
Schumber ranch, 800 feet north of house, 150 feet west of road, in root of pine tree; nail.....	1,796.42
Schumber ranch, 1.0 mile north of, 150 feet west of road, 300 feet from Methow River, in root of pine tree; nail.....	1,811.56
Methow River, surface of water .....	1,787.0
Winthrop, at town pump, 100 feet south of Methow Trading Co.'s store and 100 feet north of hotel; iron post stamped "1765 T" .....	1,765.499

## FROM MOUTH OF LIBBY CREEK NORTH ALONG TRAIL UP LIBBY CREEK AND SMITHS CANYON TO TWISP.

Lookout Mountain, summit of pass east of, between Libby Creek and Twisp Creek, on west side of trail; on top of rock 4 by 5 by 9 feet .....	3,533.99
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## NEWBY RANCH NORTH ALONG TRAIL UP ELBOW COULEE TO WINTHROP.

Summit between Elbow Coulee and Rader Lake, 50 feet east of trail; on top of white rock.....	2,629.67
Rader Lake (Moccasin Lake), water surface.....	2,193.3
Schumber ranch, 800 feet north of house, 150 feet west of road, in root of pine tree; nail.....	1,796.42

## WINTHROP EAST ALONG HIGHWAY UP BEAR CREEK TO MOUTH OF PIPESTONE CANYON.

Winthrop, 4.0 miles southeast of, 0.5 mile southwest of mouth of Pipestone Canyon, 1,000 feet north of cabin, south side of trail; iron post stamped "2398 T" .....	2,398.708
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## SILVER NORTHEAST ALONG HIGHWAY TO RED SHIRT STAMP MILL.

Silver, 25 feet south of southeast corner of post office, west side of street; iron post stamped "1513 T" .....	1,513.012
Silver, 1.0 mile north of, 250 feet southwest of schoolhouse, 50 feet west of road, in root of double pine tree; nail.....	1,556.78
Silver, 4 miles northeast of, 500 feet northwest of Red Shirt Mining & Milling Co.'s stamp mill, 100 feet south of Beaver Creek, north side of road; iron post stamped "1912 T" .....	1,911.960

## RED SHIRT SOUTH TO OGLESBY RANCH.

Oglesby ranch house, opposite road 30 feet northeast of, group of boulders, in granite boulder; tablet stamped "1967" .....	1,966.360
Oglesby ranch gate, 0.25 mile west of, 15 feet north of road, top of boulder; marked "1899" .....	1,899

Boyles ranch, 0.25 mile west of, 20 feet south of road, east end of line of bowlders, rock; marked "1774".....	Feet. 1, 773. 60
Red Shirt stamp mill, 600 feet northwest of, 100 feet south of Beaver Creek, at fence corner, north side of road; iron post stamped "1912".....	1, 911. 960

## UP LIBBY CREEK ALONG HIGHWAY AND TRAIL TO J. E. SMITH RANCH.

J. E. Smith ranch, 100 feet west of, where trail up Libby Creek enters ranch; iron post stamped "2500 T".....	2, 500. 683
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## UP M'FARLAND CREEK ALONG HIGHWAY AND TRAIL TO LAMBERT RANCH.

T. 31 N., R. 22 E., sec. 32, 25 feet west of gate at Lambert ranch, 10 feet east of trail, 4 miles up McFarland Creek; iron post stamped "2282 T".....	2, 282. 505
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## UP SQUAW CREEK ALONG HIGHWAY AND TRAIL TO SQUAW CREEK CAMP.

Squaw Creek camp, 1.0 mile north of, 3.0 miles from mouth of Squaw Creek, 8 feet north of road; iron post stamped "1983 T".....	1, 983. 721
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## STEHEKIN QUADRANGLE.

## HEAD OF LAKE CHELAN UP STEHEKIN RIVER TO BRIDGE CREEK.

Log cabin, on rock in trail near head of Lake Chelan.....	1, 086. 0
Cabin on trail, 0.2 mile south of, on large cottonwood tree 3 feet in diameter ..	1, 202. 7
Pine tree 2 feet in diameter, 25 feet to right of trail, on top of stone 5 feet north of tree.....	1, 285. 96
Side of ravine, top of stone, 2 cubic yards, on right side of trail; elevation marked on stake.....	1, 414. 01
Junction of Agnes and Stehekin rivers, 105 feet north of river bank, in an open space about 1,000 feet east of junction of rivers, in root of pine tree 2 feet in diameter; nail; elevation marked on a board nailed to a tree ..	1, 488. 3
Twin Lake, between two pine trees each 4 feet in diameter; these trees are 20 feet apart and near dry outlet of lake; on highest point of rock 5 by 4 by 3 feet.....	2, 152. 40
Narrow bridge on small stream, at corner of; top of rock 6 by 5 by 3 feet..	2, 001. 00
Cabin, 155 feet north of, in root of 5-foot cedar tree; nail.....	2, 059. 79
Bridge Creek, 225 feet south of new bridge, in root of 2½-foot fir tree; nail..	2, 174. 58
NOTE.—The remainder of this line is unadjusted and closes 3 feet high.	
Park Creek bridge, at west end of bridge, in fir stump 1½ feet in diameter; nail.....	2, 255. 72
State road camp on Stehekin River, 125 feet west of trail leading to, on top of rock 8 by 6 by 6 feet, 22 feet south from tree 3 feet in diameter.....	2, 689. 18
Pershall cabin, 25 feet from northeast corner of, in root of 2-foot cottonwood tree; nail.....	3, 101. 67
Pass, at first summit of, in root of hemlock tree; nail.....	4, 900. 93
Summit; iron post stamped "5423".....	5, 393. 286

TWISP WEST ALONG HIGHWAY AND TRAIL UP TWISP AND DOWN BRIDGE CREEKS TO MOUTH  
OF BRIDGE CREEK.

South Creek, 3.0 miles east of crossing, in top of stump in center of road; nail ..	2, 890. 07
South Creek crossing, 300 feet west of, south side of road, in root of fir tree; nail.....	3, 120. 10
Gilbert camp, 50 feet east of assay office, south side of street; iron post stamped "3527 T".....	3, 527. 567
Gilbert, 2.0 miles west of, north side of trail, at foot of fir tree 45 inches in diameter; on top of stone.....	4, 251. 89
Gilbert, 3.0 miles west of, 4 feet east of north end of bridge over Twisp River; cross on top of large flat bowlder.....	4, 485. 04

	Feet.
Twisp Pass, summit of, 10 feet south of trail; iron post stamped "6066 T" .	6,066.274
Twisp Pass, 2.5 miles west of, south side of trail; on top of stone.....	5,063.72
Twisp Pass, 5.0 miles west of, 5 feet south of trail, in root of tree; nail....	3,802.68
Twisp Pass, 11 miles west of, west side of trail; on top of stone.....	3,473.90
Twisp Pass, 12 miles west of, 0.2 mile east of Maple Creek, south side of trail, in root of tree; nail.....	3,190.23
Bridge Creek, 0.5 mile east of mouth of, 10 feet south of trail, in root of cedar tree 6.5 feet in diameter; nail.....	2,556.32
Bridge Creek, mouth of, 225 feet south of new bridge, in root of fir tree 2.5 feet in diameter; nail.....	2,174.58

UP CHEWAWA AND BUCK CREEKS NORTHWEST ALONG HIGHWAY TO BUCK CREEK PASS (PORTION  
OF SPUR LINE FROM LEAVENWORTH).

Rock Creek, 4.5 miles northwest of, 6 feet east of trail in middle of open bushy west slope about 200 feet south of little stream, in rock about 6 feet square and 3 feet high; bronze tablet stamped "2637 T" .....	2,637.818
Rock Creek, 6.5 miles northwest of, 2 feet east of trail, 300 feet north of small stream, in root of big fir tree; nail marked "2660" .....	2,660.54
Phelps Creek, 125 feet south of, 36 feet northeast of trail, in big rock; bronze tablet stamped "2782 T" .....	2,782.595
Phelps Creek, 0.8 mile northwest of, 60 feet north of little creek, 6 feet west of trail, in root of hemlock tree; nail marked "2914" .....	2,914.87
Phelps Creek, 1.5 miles northwest of, near north edge of big open burn, east of trail, in root of big fir tree; nail marked "3044" .....	3,044.74
Buck Creek, 900 feet southeast of, 2 feet east of Chewawa Creek, top of quartz-crowned projection on bedrock about water level (high); marked "3217" .....	3,217.87
Chewawa Creek, 2 feet east of, 1,125 feet north of Buck Creek, 12 feet north of trail, in bedrock about high-water level; bronze tablet stamped "3373 T" .....	3,373.208
Forks of Buck and Chewawa Creeks, 1.0 mile northwest of, about 200 feet northwest of little creek in meadow, 12 feet west of trail, in root of fir tree; nail marked "3840" .....	3,840.67
Forks of Buck and Chewawa Creeks, 2.0 miles northwest of, 11 feet west of trail, in root of spruce tree; nail marked "4254" .....	4,254.34
Forks of Buck and Chewawa Creeks, 3.0 miles northwest of, 675 feet south- east of Buck Creek ford, 4 feet west of trail; top of big rock marked "4471" ..	4,471.48
Buck Creek, surface of water at trail crossing, September 20, 1901.....	4,494.8
Forks of Buck and Chewawa Creeks, 4.0 miles northwest of, 135 feet west of Buck Creek, 9 feet east of trail, in top of big plane-topped slaty rock about 15 inches in diameter; bronze tablet stamped "4885 T" .....	4,885.200
Buck Creek, at extreme headwaters of, 5.0 miles northwest of forks of Buck and Chewawa Creeks, 600 feet north of trail, 500 feet south of lowest sag in saddle at summit of Cascade Divide; in large rock; tablet stamped "5796" .....	5,796.586
Summit of pass at headwaters of Buck Creek; ground at lowest sag in saddle.	5,785.83

Bellingham and Mount Vernon 30' Quadrangles, Blaine and Sumas 15'  
Quadrangles.

SKAGIT, SNOHOMISH, AND WHATCOM COUNTIES.

The elevations in the following list were determined by primary leveling extended from tidal-gage bench marks established by the Coast and Geodetic Survey at Fairhaven and Tulalip.

The leveling was done as follows: Blaine, Sumas, and Bellingham quadrangles in 1905 by G. C. Jacobs; Bellingham quadrangle by W. S. Wheeler in 1898; Mount Vernon quadrangle in 1898 by L. D. Ryus and Wheeler, and in 1909 by W. A. Gelbach. The work of 1909 was done in cooperation with the State.

## MOUNT VERNON QUADRANGLE.

## BELLEVILLE SOUTH ALONG GREAT NORTHERN RAILWAY TO MARYSVILLE.

Belleville, 75 feet north of track west of main street, 125 feet northwest of station; iron post stamped "29 B" .....	Feet. 30.058
Burlington, 0.5 mile north of, 30 feet west of railroad, 300 feet north of railroad switch, 1,260 feet south of yard-line signboard for Burlington, in base of 8-foot cedar stump 15 feet high; nail in notch; marked "29".....	30.008
Burlington, southeast corner of school yard, at northwest corner of Fairhaven and Regent avenues, 24 feet north of fence; iron post stamped "35 B".....	35.753
Burlington, south of, bridge over Skagit River.....	48.4
Mount Vernon, 150 feet southwest of station, 50 feet east of Hotel Mount Vernon, 12 feet north of sidewalk, east side of woven-wire fence; iron post stamped "Prim. Trav. Sta. No. 17, 23 WASH 1909".....	23.669
Mount Vernon, 2.4 miles south of, at crossing, 100 feet west of tracks, on south side of road; iron post stamped "9 WASH 1909".....	8.978
Fir, 75 feet southwest of station, southeast corner of crossroads, 3 feet east of telephone pole; iron post stamped "Prim. Trav. Sta. No. 1, 5 WASH 1909".....	5.466
Milltown, 200 feet north of station sign, 100 feet east of tracks, on east side of road, 3 feet west of Milltown pool room, 5 feet north of telephone pole; iron post stamped "4 1909 WASH".....	4.209
Stanwood, 50 feet west of station, 6 feet north of sidewalk; iron post stamped "Prim. Trav. Sta. No. 2, 5 WASH 1909".....	5.390
Stanwood station, 2.0 miles southeast of, 100 feet south of track, on east side of road at crossing; iron post stamped "10 WASH 1909".....	10.039
Norman, in front of platform; top of rail.....	33.6
Silvana, 70 feet south of station, 70 feet east of tracks, on east side of fence; iron post stamped "Prim. Trav. Sta. No. 3, 28 1909 WASH".....	27.929
English, 300 feet north of platform, 100 feet east of tracks, on east side of road by rail fence; iron post stamped "121 WASH 1909".....	119.795
Stimpson Crossing, at; top of rail.....	96.7
Marysville, 3.4 miles north of, at crossing, 60 feet east of tracks, on north and west side of roads; iron post stamped "70 WASH 1909".....	69.158

## WOOLLEY SOUTH ALONG NORTHERN PACIFIC RAILWAY TO HARTFORD JUNCTION.

Woolley, 20 feet northeast of northeast corner of station; iron post stamped "50 T. U. L.".....	50.204
Seattle & International Railway and Seattle & Northern Railway; crossing, top of rail .....	55.38
Clear Lake, 36 feet north of station, 12 feet east of northeast corner of platform; iron post stamped "44 T. U. L.".....	44.050
Clear Lake, in front of station; top of rail.....	43.5
Parker, in front of station; top of rail.....	91.9
Montborn, in front of station; top of rail.....	115.7
McMurray, about 1,000 feet north of station, 25 feet east of track, about 300 feet north of seventieth milepost, in colored rock; copper bolt stamped "246 T. U. L.".....	246.210

	Feet.
McMurray, in front of station; top of rail.....	246. 4
Lake Cavanaugh road crossing, about 1,080 feet north of sixty-ninth mile-post, 480 feet east of, in dark-colored rock, 8 feet north of road; copper bolt stamped "259 T. U. L.".....	259. 255
Bryant, 270 feet south of station, 25 feet west of tracks; iron post stamped "171 T. U. L.".....	170. 015
Arlington, in front of State bank; hydrant.....	112. 408
Arlington, 1.5 miles south of, 40 feet west of track, in root of 36-inch cedar tree; nail.....	131. 20
Arlington, 3.0 miles south of, 100 feet north of slide guard to west of track, in root of 30-inch cedar stump 3 feet high, 5 feet west of track; nail.....	145. 22
Seattle & International Railway bridge over Stimson Logging Railroad, 500 feet south of, 10 feet east of track, 20 feet south of half-mile board, in 42-inch cedar stump 4 feet high; nail.....	159. 80
Getchell, 0.8 mile south of, 6 feet east of track, at top of divide, in 84-inch cedar stump 9 feet high; nail.....	342. 42
Hartford Junction, 1.0 mile north of, 15 feet west of track, in 108-inch cedar stump; nail.....	292. 40
Hartford Junction; in front of station; top of rail.....	232. 0
Hartford Junction, junction of Seattle & International Railway and Everett & Monte Cristo Railroad, switch; top of rail.....	229. 84
Hartford Junction, 25 feet northeast of station, midway between tracks of Seattle & International Railway and Everett & Monte Cristo Railroad; iron post stamped "232 T. U. L.".....	230. 816
Lake Stevens; surface of water November 9, 1909.....	210. 9

**TULALIP EAST ALONG HIGHWAY TO MARYSVILLE, THENCE NORTHEAST ALONG STIMSON LOGGING RAILROAD TO NORTHERN PACIFIC RAILWAY.**

Tulalip, about 275 feet southeast of clayey bluff on which Madrona triangulation station stands, on southeast face of large flat granite boulder below mean sea level; cross mark.....	-3. 540
Tulalip Indian Reservation Agency, 125 feet north of corner of picket fence, 75 feet south of road and about 225 feet north of west of northwest corner of fence around agency, in gray granite rock which stands one foot out of ground; copper bolt stamped "65 T. U. L.".....	64. 715
Marysville, 50 feet south of southeast corner of station, about 50 feet east of track; iron post stamped "16 T. U. L.".....	14. 972

**HARTFORD JUNCTION EAST ALONG NORTHERN PACIFIC RAILWAY TO GRANITE FALLS, THENCE NORTHWEST ALONG HIGHWAY TO ARLINGTON.**

Lochsloy, 70 feet south of Lochsloy saloon, south side of road, 8 feet southeast of large stump; iron post stamped "248 WASH 1909".....	246. 716
Granite Falls, 3.0 miles northwest of, 0.5 mile southwest of Anderson's shingle mill, in fork of road; iron post stamped "309 WASH 1909".....	307. 774
Granite Falls, 4.0 miles northwest of, on Arlington road on east side of river, crossing of skid road to Anderson's mill, in root of tree on south side of road; copper temporary bench mark.....	296. 52
Granite Falls, 7.0 miles northwest of, west side of road, north of Hans Lund's gate, 7.5 miles southeast of Arlington; iron post stamped "Prim. Trav. Sta. No. 7, 156 WASH 1909".....	154. 836
Arlington, 4.0 miles southeast of, on east side of river on Granite Falls road, west side of road, 30 feet north of T road east; iron post stamped "98 WASH 1909".....	96. 272
Arlington, hydrant in front of Arlington State Bank; on letter "R".....	112. 41



Arlington, Haller schoolhouse, 5 feet east and 3 feet north of northwest corner; iron post stamped "104 T. U. L." .....	Feet. 102. 579
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## ARLINGTON WEST ALONG HIGHWAY TO SILVANA.

Silvana, 3.0 miles east of, 3.5 miles west of Arlington, southwest corner of crossroads, northeast corner of school yard, 15 feet west of corner of fence, school district No. 22; iron post stamped "46 WASH 1909" .....	44. 658
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## M'MURRAY WEST ALONG HIGHWAY TO MILLTOWN.

McMurray, 0.8 mile south of, 480 feet east of crossing, 8 feet north of road, in rock; copper bolt.....	259. 255
McMurray, opposite station, 60 feet east of same on east side of tracks, 3 feet south of gate; iron post stamped "Prim. Trav. Sta. No. 11, 246 WASH 1909" .....	246. 664
Milltown, 2.8 miles east of, 5 feet south of school yard gate, outside of fence; iron post stamped "353 WASH 1909" .....	353. 774

## WOOLLEY WEST ALONG GREAT NORTHERN RAILWAY TO WHITNEY, THENCE SOUTH AND EAST ALONG HIGHWAY TO FIR.

Woolley, 0.7 mile west of, 2,700 feet east of milepost 20, 2.7 miles east of county road crossing, on north side of railway, in notch in base of cedar stump 6 feet high and 6 feet in diameter; nail.....	48. 891
Woolley, 1.3 miles west of, at northwest corner of intersection of Woolley and Burlington County road and railroad right of way, across track from Hansen place, in base of cedar stump 15 feet high and 7 feet in diameter, in notch; spike.....	46. 07
Woolley, 2.2 miles west of, at northeast corner of intersection of county road and railroad right of way, in line of fence on east side of north-south county road, between secs. 33 and 34, T. 35 N., R. 4 E., 185 feet south of section corner of secs. 27, 28, 33, and 34, 2 feet north of line of fence on north edge of railroad right of way, 345 feet east of station of Sterling shingle mill; iron post stamped "39" .....	40. 445
Burlington, 1.0 mile east of, 20 feet north of railroad, 105 feet west of county road crossing, 1,180 feet west of railroad trestle No. 25, 250 feet north-west of W. H. Joyce house, south of railroad and east of county road, in notch in base of cedar stump 7 feet high and 4½ feet in diameter; spike marked "33" .....	34. 292
Avon, 100 feet east of station, 50 feet north of track, 6 feet south of store building; iron post stamped "21 WASH 1909" .....	20. 816
Fredonia, 60 feet northeast of platform, north side of road, 30 feet west of door of Mrs. E. Brown house, in corner of picket fence; iron post stamped "8 WASH 1909" .....	8. 764
Whitney, 60 feet west of station, 10 feet south of track, 3 feet east of crossing post; iron post stamped "Prim. Trav. Sta. No. 18, 3 WASH 1909" .....	3. 339
Whitney, 2.0 miles south of, northeast corner of crossroads, southwest corner of school yard, 6 feet north of steps; iron post stamped "4 WASH 1909" .....	4. 304
La Conner, 1.0 mile east by 0.5 mile south of, northeast corner of T. road north (private road leading west), 0.25 mile west of northeast corner sec. 6, T. 33 N., R. 3 E.; iron post stamped "5 WASH 1909" .....	5. 154
La Conner, about 5.0 miles southeast of, bridge over north fork of Skagit River, west end of south approach to bridge, 4 feet west of gate, on south side of road; iron post stamped "9 WASH 1909" .....	9. 559
T. 33 N., R. 3 E., quarter corner between secs. 14 and 23, 2.25 miles west of Fir station, northeast corner of crossroads; iron post stamped "7 WASH 1909" .....	6. 961

## MOUNT VERNON EAST ALONG HIGHWAY TO BIG LAKE AND CLEAR LAKE.

Mount Vernon, 3.8 miles east of, junction of road from Mount Vernon with Big Lake-Clear Lake road, in a V formed by the roads; iron post stamped "146 WASH 1909" .....	Feet. 147.004
Big Lake, 40 feet south of station, east side of picket fence; iron post stamped "Prim. Trav. Sta. No. 13, 95 WASH 1909" .....	95.266

## MOUNT VERNON WEST ALONG HIGHWAY TO A POINT 2 MILES SOUTH OF WHITNEY.

Mount Vernon, First National Bank, 2 blocks west and 1 block north of station, south side of entrance to vestibule, 6 inches north and 8 inches east of outside edge of brick wall, in cement sidewalk; aluminum tablet stamped "24 WASH 1909" .....	24.076
Mount Vernon, 3.0 miles west of, corner of secs. 33, 34, 3, and 4, Ts. 34 and 33 N., R. 3 E., southeast corner of crossroads; iron post stamped "17 WASH 1909" .....	16.883

## ARLINGTON EAST ALONG NORTHERN PACIFIC RAILWAY TO BRIDGE OVER STILAGUAMISH RIVER.

Arlington, 3.5 miles northeast of, in root of 30-inch maple tree, south of road; nail .....	170.17
Oso, 7.5 miles west of, old trail to shack, south side of road, in 72-inch cedar stump 7 feet high; nail .....	208.72
Oso, 5.0 miles west of, 100 feet from bridge east, in root of 9-inch fir tree on north side of road; nail .....	106.46
Stilaguamish River, 0.5 mile west of iron bridge over, 150 feet southeast of road, opposite house, in sandstone ledge projecting from hill; copper bolt stamped "164 T. U. L." .....	162.787

## M'MURRAY EAST ALONG HIGHWAY AND TRAIL VIA LAKE CAVANAUGH AND DAY LAKE TO LYMAN FERRY.

Lake Cavanaugh road crossing of Northern Pacific Railway, 0.8 mile south of McMurray, 1,200 feet east of, 30 feet north of trail crossing road, in root of tree; copper temporary bench mark .....	312.66
Northern Pacific Railway crossing, 3.1 miles east of, turn of road to north, 50 feet east of corduroy bridge, junction of skid roads from south and east; iron post stamped "539 WASH 1909" .....	539.409
Grandstrom's, 0.5 mile west of, 100 feet east of road fork to farmhouse, north side of road, in root of tree; copper temporary bench mark .....	561.29
Grandstrom's, south side of road east of gate, 4.25 miles east of Northern Pacific Railway crossing; iron post stamped "Prim. Trav. Sta. No. 12, 548 WASH 1909" .....	548.085
T. 33 N., Rs. 5 and 6 E., just north of corner of secs. 13, 18, 19, and 24, crossing of Lake Cavanaugh road with range line, south of road, 17 feet east of 6-foot cedar with blazes of township line; iron post stamped "825 WASH 1909" .....	825.140
Grandstrom's, 4.6 miles east of, junction of Deer Creek trail and Lake Cavanaugh road, 350 feet east of bridge over north fork of Pilchuck, south side of road; iron post stamped "903 WASH 1909" .....	903.304
Deer Creek trail, 2 miles from Lake Cavanaugh road, 75 feet north of creek where trail branches to cabin, 155 feet east by southeast of cabin, about 0.5 mile southeast of high, round, rocky knob; iron post stamped "1150 WASH 1909" .....	1,150.615
Day Lake trail, 3.3 miles from where trail leaves public road along skid road near Lyman Ferry, east edge of trail, on higher of two boulders; aluminum tablet stamped "1352 WASH 1909" .....	1,352.407

Arlington, Haller schoolhouse, 5 feet east and 3 feet corner; iron post stamped "104 T. U. L."

## ARLINGTON WEST ALONG HIGHWAY

Silvana, 3.0 miles east of, 3.5 mile crossroads, northeast corner of school district No. 22; iron post

## MCMURRAY

McMurray, 0.8 mile south in rock; copper bolt...

McMurray, opposite station south of gate; iron post 1909"

Milltown, 2.8 miles iron post stamped

## WOOLLEY WEST ALONG

Woolley, 0.7

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198.321

107.414

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64.933

49.110

41.499

452.909

180.465

124.555

## FERDALE ALONG ROAD TO POINT 2 MILES WEST.

Ferndale, 1.1 miles west of, Pearson triangulation station; bronze tablet stamped "276 B"

Ferndale, 2.0 miles west of, in southwest angle of crossroads; iron post stamped "188 B"

276.596

188.439

## SUMAS QUADRANGLE (BELLINGHAM QUADRANGLE).

## DELTA SOUTH ALONG MERIDIAN ROAD TO BELLINGHAM.

T. 40 N., R. 3 E., sec. 19, 2 feet east of fence corner, in northwest angle of crossroads; iron post stamped "93 B"

T. 40 N., R. 2 E., sec. 36, at southeast corner of Lamont place, 125 feet north of north end of bridge, in northwest angle of crossroads; iron post stamped "72 B"

Laurel school yard, T. 39 N., R. 3 E., sec. 19, 250 feet north of crossroads, in northwest corner of school yard; iron post stamped "82 B"

T. 38 N., R. 2 E., northeast corner of sec. 1, west of road; iron post stamped "187 B"

93.412

73.154

82.654

187.821

## PRIMARY LEVELING.

83

## BELLINGHAM NORTH ALONG BELLINGHAM BAY &amp; BRITISH COLUMBIA RAILROAD TO SUMAS.

	Feet.
T. 38 N., R. 3 E., sec. 3, 50 feet north of station; iron post stamped "186 B".....	186. 298
At angle of road crossing; iron post stamped "251 B".....	251. 685
Southwest angle of road crossing, 40 feet southwest of station; iron post stamped "133 B".....	133. 900
On, 150 feet south of station, west of track, east of road; iron post stamped "83 B".....	83. 750
Clearbrook, 150 feet southeast of station, at northeast angle of road crossing; iron post stamped "66 B".....	66. 714
Sumas, 10 feet south of international boundary, west of Seattle & International Ry., at northeast corner of United States Immigration building; iron post stamped "48 B".....	48. 310
Sumas, 9.8 feet east of international boundary line monument, in granite boulder, triangulation station "Sumas;" bronze tablet stamped "202 B".....	202. 646

## HAMPTON WEST ALONG COUNTY ROAD TO MERIDIAN ROAD.

Lynden, in wall of Lynden Bank building, between large front window and main entrance, 4 feet above sidewalk; aluminum tablet stamped "95 B".	95. 046
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## CLEARBROOK WEST ALONG COUNTY ROAD TO MERIDIAN ROAD.

Northwood, T. 40 N., R. 3 E., secs. 3 and 10, 15 feet north and 30 feet east of quarter-section corner, southeast angle of crossroads; iron post stamped "132 B".....	132. 793
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## BELLINGHAM EAST ALONG NORTHERN PACIFIC RAILWAY TO WOODLAWN.

Silver Beach, 25 feet north of track, 2 feet east of northeast corner of station; iron post stamped "313".....	313. 476
Woodlawn, 40 feet north of entrance to Iverson place, 75 feet east of track, 100 feet east of edge of lake, 250 feet north of signboard; iron post stamped "319 B".....	320. 019

## DEMING WEST ALONG HIGHWAY TO GOSHEN.

Nugent, 650 feet northeast of bridge, 53 feet southeast of entrance to Nugent bridge saloon, in south angle of forks of road; iron post stamped "156 B".	156. 286
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## BELLINGHAM QUADRANGLE.

## SUMAS SOUTHEAST ALONG BELLINGHAM BAY &amp; BRITISH COLUMBIA RAILROAD TO MAPLE FALLS, THENCE BY HIGHWAY VIA LEMOLO TO COLUMBIA.

Lamberton, at road crossing, northeast of station; iron post stamped "43 B".	43. 173
Columbia, 150 feet southeast of station; iron post stamped "546 B".....	546. 480
Kendall, 250 feet east of station, 200 feet north of track at road crossing, 40 feet west of post office; iron post stamped "446 B".....	446. 680
Maple Falls, in yard 120 feet northeast of northeast corner of schoolhouse; iron post stamped "665 B".....	665. 301
Silver Lake, 300 feet east of road forks, 3 feet north of gate to Gerdrum house; iron post stamped "818 B".....	818. 496
Warner schoolhouse, 1,650 feet west of, 2 feet west of fence corner, 1 foot north of fence, 200 feet west of trail to Lemolo post office; iron post stamped "547 B".....	547. 107

## WOODLAWN SOUTH ALONG NORTHERN PACIFIC RAILWAY TO WICKERSHAM, THENCE NORTH TO DEMING, THENCE NORTHEAST ALONG HIGHWAY TO KENDALL.

Sunnyside, 150 feet west of milepost 9, 30 feet east of station, 10 feet south of track, in top of granite rock; aluminum tablet stamped "312 B"....	312. 524
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Blue Canyon, 800 feet east of coal company's bumper, 30 feet south of track, 1,200 feet east of milepost 5, in 6 by 6 by 3 foot sandstone rock; aluminum tablet stamped "318 B" .....	Feet. 318. 177
Wickersham, 2.0 miles northwest of, 185 feet west of shingle mill switch stand, 2,400 feet east of milepost 3; iron post stamped "356 B" .....	357. 096
Wickersham, at Wickersham Avenue crossing, 2.5 feet north of telegraph pole, east of track; iron post stamped "312 B" .....	312. 909
Saxon switch, 0.3 mile north of, 0.25 mile north of milepost 100, southeast angle of road crossing, near fence; iron post stamped "319 B" .....	319. 941
Green spur, 970 feet south of switch stand, west of track and south of road crossing, 950 feet south of milepost 104; iron post stamped "268 B" .....	268. 753
Van Zandt, at southeast corner of schoolhouse yard; iron post stamped "239 B" .....	239. 182
Deming, 200 feet west of Deming livery stable, 500 feet west of station, north of road and track, at southeast corner of schoolhouse yard; iron post stamped "202 B" .....	202. 686
Welcome schoolhouse, 2.0 miles north of, 1 foot west of fence, east side of road, 10 feet south of blazed cottonwood tree, T. 39 N., R. 5 E., secs. 15 and 22, on section line; iron post stamped "332 B" .....	332. 447

## FAIRHAVEN ALONG GREAT NORTHERN RAILWAY TO BELLEVILLE.

Chuckanut Creek, 0.25 mile west of, south of track, 275 feet west of bridge over slough, 500 feet west of Neff green house; iron post stamped "186 B" .....	186. 590
A. C. Milne house, 2.3 miles northwest of, 625 feet east of road to American lumber and shingle mill, 1,610 feet east of bridge over Chuckanut Creek, south of road; iron post stamped "554 B" .....	554. 789
A. C. Milne house, 1.1 miles southeast of, southwest of Lake Samish, 1,450 feet east of Manly shingle mill, 10 feet east of bridge over small stream; iron post stamped "343 B" .....	343. 591
Alger, 725 feet east of track, 260 feet south of Clear Creek bridge, 50 feet north of road forks; iron post stamped "270 B" .....	270. 262
Belfast, 1.8 miles north of, 28 feet east of track, 24 feet west of Friday Creek, 120 feet south of section tool house; iron post stamped "123 B" .....	124. 016
Moody, 90 feet west of store, 45 feet west of track, 340 feet south of trestle 5, over Samish River; iron post stamped "53 B" .....	53. 578
Belleville, 75 feet north of track, west of main street, 125 feet west of station; iron post stamped "29 B" .....	30. 058

## FAIRHAVEN ALONG GREAT NORTHERN RAILWAY TO BELLEVILLE.

Chuckanut switch, 2,750 feet south of Chuckanut salmon cannery, 135 feet south of watchman's cabin, 540 feet north of station, west of track; iron post stamped "44 B" .....	44. 273
Samish, 2.6 miles north of, 300 feet north of milepost 86, 60 feet north of emergency rail stand, 15 feet east of track, in top of flat sandstone rock; aluminum tablet stamped "38 B" .....	39. 025
Samish switch, 18 feet east of, east of track, 930 feet south of trestle 18, 60 feet south of house; iron post stamped "10 B" .....	10. 467
Bow, west of track, opposite station, 420 feet north of road crossing; iron post stamped "14 B" .....	14. 613
Bow, 2.2 miles south of, west of track, 250 feet west of E. Shumway's gate, in southwest angle of road crossing; iron post stamped "19 B" .....	19. 668

## BELLEVILLE NORTHEAST ALONG HIGHWAY TO PRAIRIE.

Moody's abandoned logging camp, 1.0 mile northeast of, Samish River bridge, in line of fence north of road opposite old blacksmith shop; iron post stamped "142 B" .....	Feet. 142. 347
Prairie schoolhouse, 0.25 mile south of, northeast angle of crossroads, north of fence corner, 1,500 feet east of Samish River bridge, 2 feet north of fence corner; iron post stamped "205 B" .....	205. 569

## WICKERSHAM SOUTH ALONG NORTHERN PACIFIC RAILWAY TO WOOLLEY.

Kane switch, 20 feet south of signboard, west of track, 10 feet south of northeast corner of Kane shingle mill office; iron post stamped "269 B" ..	269. 633
Thornwood, 75 feet south of station, west of track, 1,000 feet north of Kane water tank; iron post stamped "361 B" .....	362. 127
Sedro Woolley, 2.6 miles north of, 390 feet south of trestle No. 52, 450 feet north of milepost 88; iron post stamped "150 B" .....	151. 220

## WOOLLEY EAST ALONG GREAT NORTHERN RAILWAY TO LYMAN, THENCE SOUTH ALONG HIGHWAY TO LYMAN FERRY.

Minkler & Son's shingle mill, 700 feet west of bridge 37, 125 feet east of switch, south of track, between platform and cook house; iron post stamped "65 T.U.L." .....	63. 828
Lyman, 61.6 feet north of track and about 15 feet east of crossing at station, north side of wagon road; iron post stamped "96 WASH 1909" (probably destroyed by railroad company) .....	95. 497
Lyman, 1.0 mile east of, front of T road south of north end of bridge; iron post stamped "80 WASH 1909" .....	80. 123
Lyman Ferry, 450 feet south of, south side of main road at junction of road to ferry; iron post stamped "99 WASH 1909" .....	99. 244

## Eatonville and Mount Rainier Quadrangles.

## LEWIS AND PIERCE COUNTIES.

The elevations in the following list are based on a checked spur line based on the elevation at Orting, which is in turn based on a double-rodged line run eastward from Tacoma through the State of Washington, checked by precise leveling of the Coast and Geodetic Survey.

The leveling was done by E. M. Bandli in 1910.

## EATONVILLE QUADRANGLE.

## KAPOWSIN ALONG TACOMA EASTERN RAILROAD TO ASHFORD.

Kapowsin, in northeast corner of intersection of Trewella Avenue and street opposite Presbyterian Church, 0.5 foot west of northeast corner of fence post, 0.5 foot north of corner; iron post stamped "630" .....	Feet. 629. 723
Holz, 18 feet northeast of station, 13 feet northwest of track; iron post stamped "564" .....	563. 679
Holz, 1.3 miles southwest of, 15 feet southwest of private road, 2 feet southwest of railroad signpost, 10 feet southeast of track; iron post stamped "554" .....	554. 100
Eatonville, 20 feet north of road crossing at station, 18 feet northwest of railroad, 2 feet east of railroad crossing signpost; iron post stamped "800" .....	800. 393

Lagrande, 18 feet east of railroad, 15 feet north of road in front of post office and Hotel Lagrande; aluminum tablet stamped "942".....	Feet. 941. 806
Alder, 35 feet west of first road crossing west of station, 18 feet south of railroad, 2 feet northwest of first telegraph pole west of road crossing at station; iron post stamped "1148".....	1, 147. 667
Alder, 2.2 miles east of, 9 feet south of track; copper bench mark nail in large stump, marked "1266.1".....	1, 266. 05
Alder, 3.3 miles east of, 10 feet north of track, 15 feet west of road at crossing, 120 feet south of new county road; iron post stamped "1207".....	1, 207. 208
Alder, 5.4 miles east of, at road crossing, 50 feet northeast of track, 15 feet north of road, copper bench mark nail in stump, marked "1173.3".....	1, 173. 30
Elbe, 50 feet east of track, 18 feet north of road crossing just north of station, 2 feet north of railroad signpost; iron post stamped "1210".....	1, 210. 442.
Elbe, 2.6 miles east of, 18 feet north of track, east of park junction opposite switch; copper bench mark nail in stump, marked "1344.7".....	1, 344. 74
Elbe, 4.5 miles southeast of, 15 feet south of track, 3 feet northwest of telegraph pole near logging camp; iron post stamped "1439".....	1, 438. 684
Ashford, 0.25 mile west of, at road crossing, 60 feet southeast of road crossing; copper bench mark nail in stump, marked "1737.6".....	1, 737. 58
Ashford, 12 feet south by 20 feet west of T road intersection to south, in southwest corner; iron post stamped "1771".....	1, 771. 346
Ashford, 1.5 miles northeast of, south side of road at curve to north, 6 feet south of road; copper bench mark nail in stump, marked "1839.3".....	1, 839. 29

## MOUNT RAINIER QUADRANGLE.

## POINT NEAR ASHFORD EAST ALONG ROAD AND TRAIL TO M'CLURE ROCK.

Ashford, 2.7 miles northeast of, 20 feet northwest of intersection of crossroads of road to Lewis and road to National Park, 3.5 miles from Mount Rainier National Park entrance, in northwest corner of crossroads; iron post stamped "1839".....	1, 839. 046
Ashford, 3.8 miles northeast of, 12 feet west of bridge north of road, 4 feet from road; copper bench mark nail in stump, marked "1852.2".....	1, 852. 22
Ashford, 6.4 miles northeast of, at Mount Rainier National Park entrance, at side of flagpole, 36 feet in front of park entrance building, 15 feet from road southeast; iron post stamped "2003".....	2, 003. 175
Ashford, 7.4 miles northeast of, 1 mile in Mount Rainier National Park, 10 feet north of road; copper bench mark nail in root of tree, marked "2106".....	2, 105. 695
Ashford, 9 miles from toward Longmire Springs, 4 feet north of road, at curve of road opposite raiing along south side of road, in ledge of rock; aluminum tablet stamped "2275".....	2, 274. 771
Ashford, 9.9 miles from toward Longmire Springs, 10 feet south of road near bridge at Rainier Forks; copper bench mark nail in large stump, marked "2378.7".....	2, 378. 65
Ashford, 11.1 miles from toward Longmire Springs, 20 feet south of road near intersection of old and new roads; iron post stamped "2499".....	2, 498. 740
Longmire Springs, in front of Foresters' building, beside flagpole, 3 feet west and north of flagpole; iron post stamped "2762".....	2, 761. 857
Longmire Springs, 0.4 mile northeast of, along road to Mount Rainier, opposite Indian Henry trail, 20 feet south of road; copper bench mark nail in large stump, marked "2824.3".....	2, 824. 30
Longmire Springs, 2 miles northeast of, 100 feet east of Paradise trail, 10 feet southeast of road; iron post stamped "3160".....	3, 159. 639

Longmire Springs, 5 miles from along road to Mount Rainier, at Nisqually Glacier, 60 feet east of road at bridge, in large boulder on north bank of Nisqually River; aluminum tablet stamped "3909".....	Feet. 3,908.628
Longmire Springs, 6.7 miles from along road to Mount Rainier, at Gap Point, 4 feet east of road; bench mark on point on rock, marked "4212.3".....	4,212.31
Nerada Falls, 15 feet south of road, 15 feet southwest of bridge, 3 feet east of two trees at curve of road to east; iron post stamped "4572".....	4,572.242
Reese camp, 15 feet south of road, 5 feet east of last tree nearest road; iron post stamped "5557".....	5,557.481
McClure Rock, 2 miles from Reese camp on route to mountain, in large rock in top near large pile of rock at signal station, on highest ledge some few rods from edge of rock ledge; aluminum tablet stamped "7385".....	7,385.127

## Cedar Lake, Seattle, Sultan, and Tacoma Quadrangles.

## KING, KITTITAS, AND PIERCE COUNTIES.

The elevations in the following list are based on the Coast and Geodetic Survey precise line.

The leveling was done in cooperation with the State by D. S. Birkett during 1910. The standard bench marks are stamped "WASH" in addition to the figures of elevation. A few bench marks were established in the Tacoma quadrangle in 1910 by E. M. Bandli.

## CEDAR LAKE QUADRANGLE.

POINT NEAR KANASKAT NORTH ALONG NORTHERN PACIFIC RAILWAY TO POINT NEAR BARNESTON, THENCE EAST ALONG CHICAGO, MILWAUKEE & PUGET SOUND RAILWAY TO POINT 1 MILE EAST OF RAINY CREEK.

Kanaskat and Palmer Junction, between, about 50 meters east of milepost 211, at west end of Northern Pacific Railway bridge over Green River, 0.2 meter from east edge and 0.1 meter from south edge, 1.5 meters from nearest rail, in top of concrete abutment for approach; copper bolt (Coast and Geodetic Survey bench mark).....	Feet. 847.924
Kangley Junction, 50 feet west of Northern Pacific Railway tracks, 40 feet north of intersection of tracks; spike in 2-foot maple tree.....	943.90
Kangley, on Kerriston branch of Northern Pacific Railway, 35 feet north by 50 feet east of railroad station, corner of fence north side of wagon road crossing railroad; iron post stamped "958 WASH".....	957.517
Cedar River bridge on Kerriston branch of Northern Pacific Railway, 1.2 miles south of, 1.6 miles south of Barneston, 10 feet east of track; point on top of 2½ by 2½ by 2 foot granite boulder; marked "U. S. 893 B. M.".....	892.57
Iolanthe siding, 1,000 feet east of east end of, 4.3 miles west of Moncton, east end and on north side of track, in concrete abutment of steel bridge FF 124; aluminum tablet stamped "Prim. Trav. Sta. No. 9 1910 799 WASH".....	798.990
Moncton, 1 mile west of, Chicago, Milwaukee & Puget Sound steel bridge FF 120 over Cedar River, north side of track, 5 inches from north and west edges, in top of concrete abutment; aluminum tablet stamped "920 WASH".....	920.353
Moncton, 1.3 miles east of, point where county road from North Bend to Cedar Lake crosses the Chicago, Milwaukee & Puget Sound Railway (main line), 20 feet east of road and 30 feet south of railroad track; iron post stamped "1041 WASH".....	1,041.480



Chenge Creek bridge, 2.4 miles west of Garcia (bridge FF 112), east end of, on concrete abutment north side of track, at west end of the long abutment near where the steel structure of the bridge joins on; bronze tablet stamped "1455 WASH" .....	Feet. 1, 455. 241
Garcia, 740 feet east of station, wall of rock through cut, 15 feet north of track; aluminum tablet (placed nearly vertical), stamped "Prim. Trav. Sta. No. 10 1910, 1669 WASH" .....	1, 669. 168
Rock Creek, 2.8 miles east of Garcia, west end of filled trestle over creek, at end of cut, 50 feet south of railroad track; iron post stamped "1884 WASH" ..	1, 884. 152
Bandera, 20 feet west of telephone booth (no station house), 30 feet south of track, in knuckle at base of 2½-foot cedar stump 6 feet high; copper bench-mark nail; aluminum tag stamped "2123" .....	2, 123. 46
Hanson Creek bridge (steel) FF 88, 0.6 mile east of Bandera, east end of bridge, in concrete abutment north side of track and at west end, 2 feet from point where steel structure joins on top of concrete; aluminum tablet stamped "2167 WASH" .....	2, 167. 666

POINT NEAR BARNESTON NORTH ALONG KERRISTON BRANCH OF NORTHERN PACIFIC RAILWAY  
VIA KERRISTON TO POINT 2 MILES SOUTHEAST OF PRESTON.

Barneston, 3 miles north of, 0.4 mile east of milepost 9, 40 feet west of south end of trestle No. 8; iron post stamped "1074 WASH" .....	1, 073. 733
Taylor, 1.5 miles east of, 5.1 miles north of Barneston, junction of old skid road (trail to Taylor) with Northern Pacific Railway, 30 feet west of railroad, south side of skid road; iron post stamped "1327 WASH" .....	1, 327. 036
Kerriston, 0.3 mile south of station, 420 feet south of point where switch-back of Northwest Lumber Co.'s logging railroad leaves the Northern Pacific Railway, 10 feet west of Northern Pacific tracks, 25 feet east of logging railroad, in knuckle at base of 5-foot cedar stump 10 feet high; copper bench-mark nail; aluminum tag stamped "1374" .....	1, 374. 00
Kerriston, 650 feet north of Northwest Lumber Co.'s mill, 70 feet south of head office, 100 feet east of logging railroad, 25 feet northeast of blacksmith shop, in niche on granite boulder 15 feet high and 18 feet in diameter, 3 feet above ground; aluminum tablet stamped "1214 WASH" .....	1, 213. 832
Kerriston, 2.8 miles north of, 15 feet west of Northern Pacific Railway, at base of 3½-foot cedar stump 10 feet high; spike; aluminum tag stamped "1094" .....	1, 093. 87
Kerriston, 3.3 miles north of Northwest Lumber Co.'s mill, 250 feet north of junction of logging road with Northern Pacific Railway, 25 feet west of Northern Pacific tracks, 18 feet east of logging tracks; iron post stamped "1045 WASH" .....	1, 044. 778
Kerriston, 4 miles northwest of, point where logging railroad divides, one spur leads to northwest and main line turns to south to logging camp, 30 feet west of junction and 20 feet north, 120 feet west of tool house, spike in base of hemlock tree; aluminum tag stamped "936" .....	935. 95

POINT 1.5 MILES EAST OF TAYLOR WEST ALONG SKID ROAD AND COLUMBIA & PUGET SOUND  
RAILROAD TO POINT 1.4 MILES WEST OF HOBART.

Taylor, 50 feet east of Columbia & Puget Sound Railroad station, 50 feet north of railroad, 5 feet west of fence about hotel lawn; iron post stamped "1159 WASH" .....	1, 158. 666
Walsh, southeast corner of school yard, 50 feet east of Columbia & Puget Sound Railroad, 50 feet north of county road; iron post stamped "767 WASH" .....	766. 998
Hobart, 90 feet west of Columbia & Puget Sound station, 40 feet north of saloon, 45 feet south of railroad track, west edge of county road; iron post stamped "549 WASH" .....	549. 319

HENRYS SWITCH ON NORTHERN PACIFIC RAILWAY TO POINT ABOUT 1 MILE WEST OF RAVENS-  
DALE.

Henrys switch, 900 feet west of, 2 miles west of Ravensdale, in top of concrete pier for steel bridge of Columbia & Puget Sound Railroad crossing Northern Pacific Railway, south side of latter and west side of former tracks, northwest corner of pier; point marked by circle inclosing cross, and "U. S. 564 B. M." .....	Feet. 564. 65
Ravensdale, 1.9 kilometers west of, north side of Northern Pacific Railway in top of concrete arch of culvert at northeast corner; copper bolt (Coast and Geodetic Survey bench mark) .....	576. 586

POINT 1.3 MILES EAST OF MONCTON ALONG ROAD TO CEDAR LAKE AND RETURN (CHECKED  
SPUR LINE).

Moncton, 1 mile east of, on wagon road from Moncton to new dam site, Cedar Lake, junction with North Bend road, 90 feet west of, north side of road, in base of hemlock tree, nail marked with ring of red paint; aluminum tag stamped "1237" (city of Seattle bench mark) .....	1, 237. 02
Cedar Lake, 150 feet east of north side of new dam site, 50 feet south of wagon road from new dam to old dam, 65 feet east of bunkhouse 1, embedded in concrete block, a truncated pyramid in shape, 4 feet square at base and 1 foot square at top, 4 feet high, buried level with surface of ground, post extends 1 foot above concrete; iron post stamped "1605" ..	1, 604. 884
Cedar Lake, surface of water, November 11, 1910. ....	1, 558. 2

## SULTAN QUADRANGLE.

POINT 2 MILES SOUTHEAST OF PRESTON WEST ALONG NORTHERN PACIFIC RAILWAY TO GRAND  
RIDGE COAL MINE.

Preston Lumber Co.'s upper mill, northwest corner of school yard (district 90), 70 feet north by 25 feet west of schoolhouse, copper bench-mark nail in notch at base of 3½-foot cedar stump 8 feet high; aluminum tag stamped "595" .....	595. 23
Preston Lumber Co.'s upper mill (2 miles southeast of town of Preston), southeast corner of school yard, 60 feet south of schoolhouse, 5 feet west of school (district 90); iron post stamped "597 WASH" .....	596. 479
Preston, 500 feet east of Northern Pacific Railway station, east side of road crossing railroad track, 30 feet south of track, northwest corner of shipping shed for Preston Lumber Co.; iron post stamped "508 WASH" .....	507. 717
High Point, 50 feet west of county road crossing, 50 feet south of railroad, 7 feet north of northeast corner of post office; iron post stamped "487 WASH" .....	487. 103

## SEATTLE QUADRANGLE.

GRAND RIDGE COAL MINE ALONG NORTHERN PACIFIC RAILWAY TO ISSAQUAH, THENCE SOUTH-  
WEST ALONG WAGON ROAD TO POINT ABOUT 5 MILES SOUTHWEST OF ISSAQUAH.

Issaquah, 360 feet south of Northern Pacific Railway station, 45 feet east of railroad, north side of Mill Street, 5 feet west of southeast corner of feed stable; iron post stamped "97 WASH" .....	96. 522
Issaquah, in front of Northern Pacific Railway station; top of rail. ....	96. 9
Issaquah, 1.5 miles northwest of Renton-Snoqualmie road, 0.9 mile west of Northern Pacific Railway, north side of road, 200 feet west of schoolhouse, copper bench-mark nail in notch at base of cedar stump 6 feet in diameter and 8 feet high; aluminum tag stamped "76" .....	74. 26
Superior Mines, 3.8 miles southwest of Issaquah, west side of road, 10 feet north of northeast corner of mining company barn; iron post stamped "366" .....	365. 377

Issaquah, 4.9 miles southwest of, 0.5 mile south of shingle mill, 10 feet west of road, copper bench-mark nail in notch at base of 1½-foot cedar stump 2 feet high; aluminum tag stamped "387" .....	Feet. 386.89
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## TACOMA QUADRANGLE.

POINT 5 MILES SOUTHWEST OF ISSAQUAH ALONG WAGON ROAD TO RENTON, THENCE WEST ALONG NORTHERN PACIFIC RAILWAY TO BLACK RIVER JUNCTION.

Issaquah, 6 miles southwest of, 6.5 miles northeast of Renton, point where road forks, one branch leading to "Cedar Mountain," and the other to Issaquah, 0.5 mile east of Michael Walsh's house, 100 feet east of road intersection, 25 feet from each road and in forks; copper bench-mark nail in notch at base of 2-foot cedar stump 8 feet high; aluminum tag stamped "336" .....	335.99
T. 23 N., R. 5 E., in NE. ¼ sec. 12, 5.4 miles northeast of Renton city hall, at May Creek schoolhouse, in southwest corner of school yard, 60 feet north of county road, 40 feet south by 40 feet west of southwest corner of schoolhouse; iron post stamped "328 WASH" .....	328.054
Renton, 4.8 miles east of, on Issaquah road, 30 feet west of T in roads where Issaquah road leads north to May Creek schoolhouse, 1 mile distant, projection on top of 8 by 5 by 8 foot granite boulder marked with red paint; marked "U. S. 442 B. M." .....	441.71
Renton, 2.5 miles east of, northeast corner of sec. 16, T. 23 N., R. 5 E., south side of road, in line with high-power transmission line, 200 feet southwest of slaughterhouse; iron post stamped "401 WASH" .....	400.165
T. 23 N., R. 5 E., southwest corner of sec. 9, 1.5 miles east of Renton, point where road joins Issaquah road, 175 feet southwest of section corner, 20 feet south of road; copper bench-mark nail in notch at base of 2-foot cedar stump 4 feet high; aluminum tag stamped "268" .....	267.19
Renton, 0.7 mile east of, at T in roads where road turns south to Elliot, north side of road, 40 feet west of signboard "Seattle 14.5 miles; Snoqualmie Falls 26 miles;" copper bench mark nail in notch at base of 5-foot cedar stump 10 feet high; aluminum tag stamped "44" .....	43.57
Renton, city fire hall, concrete approach to hose-cart stalls at south end, 15 feet west of sidewalk, 1 foot east of building and 0.5 foot from south edge of approach; aluminum tablet stamped "40 WASH" .....	39.546
Black River, opposite Northern Pacific Railway station, 11.6 meters east of nearest Columbia & Puget Sound Railroad rail, 1.92 meters west of right-of-way fence; bottom of square hole cut in top of granite post, marked "U. S. □ B. M." (Coast and Geodetic Survey bench mark)...	20.540

POINT 1.4 MILES WEST OF HORART ALONG COLUMBIA & PUGET SOUND RAILROAD TO MAPLE VALLEY, THENCE SOUTH ALONG SAME RAILROAD TO POINT NEAR SUMMIT.

Maple Valley, 300 feet east of Columbia & Puget Sound Railroad station, 45 feet north of Black Diamond branch of same railroad, 30 feet east of county road, 5 feet south of a saloon; iron post stamped "343 WASH" .....	343.125
Wilderness (2 miles east of Maple Valley), 60 feet east of station platform, 50 feet south of railroad, just south of road past station; iron post stamped "475 WASH" .....	475.135
Summit (4 miles southeast of Maple Valley), 20 feet south of old station platform, 45 feet west of railroad, near fence, 16 feet south of road crossing railroad; iron post stamped "565 WASH" .....	565.180

## ORTING SOUTH ALONG LOGGING RAILROAD TO KAPOWSEN.

NOTE.—The following bench marks were established by E. M. Bandli in 1910 in connection with leveling in the Eatonville and Mount Rainier quadrangles. The work was not done in cooperation.

Orting, 150 feet west of water tank, 34.2 feet from track on south side, 3 feet west of telegraph pole, 53 feet west of Bridge street; iron post stamped "198 T" .....	Feet. 198. 088
Orting, 2.5 miles southeast of, about 20 feet east of track, 5 feet south by 1 foot west of northwest corner of fence at private road crossing; iron post stamped "281" .....	281. 303
Orting, 5.9 miles southeast of, 40 feet west of Northern Pacific Railway track, 2 feet east of fence, in front of Gipple's house, 10 feet south of gate to house; iron post stamped "420" .....	419. 699
Orting, 7.9 miles southeast of, 40 feet south of railroad, in base of 5 foot stump painted "544.7 B. M."; copper bench-mark nail.....	544. 74
Ts. 17 and 18 N., R. 5 E., 4 feet west of section corner common to secs. 5 and 32, 8.7 miles southeast of Orting, 0.5 mile west of Electron, 9 feet south of road, 20 feet east of railroad; iron post stamped "583" .....	582. 858

## Fort Simcoe and Mount Adams Quadrangles.

## YAKIMA AND KLIKITAT COUNTIES.

The elevations in the following list are based upon an iron post at Parker siding, stamped "937 T" on a double primary level line of the Geological Survey run in 1898 along the Northern Pacific Railway and later re-covered by the Coast and Geodetic Survey transcontinental level party. The elevation of this bench mark is now accepted as 937.665 feet.

The leveling was done in 1903 by C. E. Hill and R. B. Shaw.

## FORT SIMCOE QUADRANGLE.

## PARKER SIDING VIA COUNTY ROAD TO FORT SIMCOE.

Parker siding, 100 feet west of cattle guard of Northern Pacific Railway, 100 feet north of intersection of Toppenish and Fort Simcoe roads; iron post stamped "937 T" .....	Feet. 937. 665
Parker siding, 3 miles southwest of, 6 feet south of road; iron post stamped "923 T" .....	923. 696
Parker siding, 6 miles southwest of, 8 feet south of road; iron post stamped "912 T" .....	912. 513
Parker siding, 9 miles southwest of; in road, between two wagon tracks; iron post stamped "867 T" .....	867. 613
Bur Lake, 200 feet north of, 6 feet south of road, at turn in fence; iron post stamped "844 T" .....	844. 438
Bur Lake, water level, April 14, 1903.....	839
Luke ranch, corner of fence 10 feet north of road; iron post stamped "892 T" .....	892. 102
Luke ranch, 3 miles southwest of, 10 feet south of road at fence corner; iron post stamped "988 T" .....	988. 356
Simcoe Creek, water level under bridge, April 20, 1903 .....	991. 59
Simcoe Creek bridge, 2 miles southwest of, at forks of road, 30 feet west of fence corner; iron post stamped "1075 T" .....	1,075. 455
Fort Simcoe, in yard of Indian agent's residence, at northeast corner of fence; iron post stamped "1427 T" .....	1,427. 449

## FORT SIMCOE BY COUNTY ROAD AND TRAIL TO BUSH CREEK.

	Feet.
Abraham Lincoln's ditch, at road crossing, water level, April 27, 1903.....	1,296
Harbaugh ranch, 1.3 miles south of, 60 feet south of bridge over Toppenish River, in forks of road; iron post stamped "1312 T".....	1,312.896
Bridge over Toppenish River, 5 miles south of; 150 feet east of edge of first pine timber, 10 feet north of road; iron post stamped "2716 T".....	2,716.504
Reservation sawmill (abandoned), 0.6 mile southwest of; 4 feet west of road; iron post stamped "3077 T".....	3,077.766
Reservation boundary, 1.9 miles southwest of; in forks of road to blockhouse and Hopper mill, 8 feet north of, bearing signboard; iron post stamped "3416 T".....	3,416.844
Bush Creek, at road crossing; water surface, May 12, 1903.....	3,077.9

## FORT SIMCOE BY COUNTY ROAD AND TRAIL TO RATTLESNAKE RIDGE.

Fort Simcoe, 3.4 miles north of, 60 feet west of road, on summit; iron post stamped "1437 T".....	1,437.403
Simcoe Creek, at road crossing, water surface, May 25, 1903.....	1,236.82
Sam Abraham house, 15 feet southwest of southwest corner of, 7 feet west of road, at turn; iron post stamped "1351 T".....	1,351.367
Tzapass Creek ford, 0.3 mile northwest of, 450 feet north of Tzapass Creek, 110 feet south of road, on small road 60 feet in width; iron post stamped "1615 T".....	1,615.445
Mouth of Idleat Creek, 1 mile west of; 100 feet south of trail up ridge, on scab rock slope; small mound 80 feet in diameter; iron post stamped "2580 T".....	2,580.478

NOTE.—The following are United States Reclamation Service bench marks in Tps. 10 and 11 N., R. 18 E.:

T. 10 N., R. 18 E., northeast corner of sec. 22, nail in fence corner post...	785.9
T. 10 N., R. 18 E., northeast corner of sec. 22, 1 foot south of fence, 6 feet east of apex of jog to west in north and south fence; iron post stamped "785"...	786.004
T. 10 N., R. 18 E., northeast corner of sec. 15 (Castile's bench mark 794.29)...	793.7
T. 10 N., R. 18 E., northeast corner of sec. 10 (Castile's bench mark 795.94)...	796.7
T. 10 N., R. 18 E., northeast corner of sec. 21.....	796.2
T. 10 N., R. 18 E., quarter corner east side of sec. 16.....	794.6
T. 10 N., R. 18 E., northeast corner of sec. 4; iron post stamped "808"....	808.853
T. 11 N., R. 18 E., northeast corner of sec. 21; iron post stamped "868"....	869.052
T. 12 N., R. 18 E., southeast closing corner of sec. 33; iron post stamped "970"...	971.350

## MOUNT ADAMS QUADRANGLE.

## BUSH CREEK WEST TO PARROT'S BRIDGE.

Hopper mill, fork road 7 miles north of, 72 feet south of small stream flowing into White Creek, 12 feet south of road; iron post stamped "2884 T"...	2,884.819
White Creek ford, 90 feet west of, 7 feet south of road; iron post stamped "2554 T".....	2,554.525
White Creek ford, 3 miles west of, 1,600 feet southwest of open marsh, 15 feet south of road; iron post stamped "2693 T".....	2,693.474
Parrot ranch, 4 miles northeast of, 50 feet northeast of junction of Parrot's road and new country road; iron post stamped "2217 T".....	2,217.399
Trout Creek, water surface at road crossing, August 27, 1903.....	1,868.79
Parrot ranch, just outside of yard at northwest corner; iron post stamped "1757 T".....	1,757.457
Bear Creek, water level at road, August 26, 1903.....	1,889.87

Klickitat River, under Parrot's cable sheep bridge; water surface, August 24, 1903.....	Feet. 1,653.59
Bacon Creek, 0.7 mile northwest of, 100 feet southeast of Parrot's cable sheep bridge, 4 feet north of trail, in basalt outcrop on top of south bank of river; bronze tablet stamped "1741 T".....	1,741.314

## RATTLESNAKE RIDGE SOUTHWEST AND SOUTH TO GLENWOOD.

T. 11 N., R. 14 E., sec. 24, on Rattlesnake Ridge, Idleat Creek, 5 miles west of mouth, in outcrop bedrock 2 feet square and 1 foot high; bronze tablet stamped "4449 T".....	4,449.599
T. 11 N., R. 14 E., sec. 32 (unsurveyed section), Piscoe Creek crossing, 0.3 mile west of, 10 feet south of trail, 450 feet west of creek; iron post stamped "4669 T".....	4,669.428
T. 10 N., R. 13 E., about sec. 4 (unsurveyed section), Piscoe meadows, 6.1 miles west of, 30 feet west of Little Klickitat River, 300 feet east of Big Klickitat River, 2 feet east of trail up Big Klickitat River, on point of ridge; iron post stamped "3368 T".....	3,368.452
Little Klickitat River, water surface at point of ridge, July 2, 1903.....	3,353.86

## MOUTH OF LITTLE KLICKITAT RIVER VIA TRAIL DOWN KLICKITAT RIVER TO GLENWOOD.

Klickitat River, north of mouth of Piscoe Creek, at trail, just above thicket; water surface July 6, 1903.....	3,235.49
T. 10 N., R. 13 E., about sec. 20 (unsurveyed section), Little Klickitat River, 3.9 miles south of mouth, 70 feet northwest of Klickitat River, 250 feet from small creek, on rocky point; iron post stamped "3189 T".....	3,189.496
T. 9 N., R. 12 E., sec. 1, Corral Creek, 100 feet north of, 40 feet east of Fish Lake trail, 10 feet west of trail up Klickitat; iron post stamped "2895 T".....	2,895.341
Soda Spring, 10 feet west of, 10 feet south of trail; iron post stamped "2680 T".....	2,681.586
T. 8 N., R. 12 E., sec. 21, Big Muddy Ford, 1 mile east of, on summit of ridge between Big Muddy and Cunningham Creek, 5 feet southeast of trail, in large flat boulder; bronze tablet stamped "2958 T".....	2,958.760
Big Muddy Creek, under bridge; water surface August 1, 1903.....	2,958.91
T. 7 N., R. 12 E., sec. 3, Big Muddy Creek, 0.5 mile south of mouth, 15 feet east of trail, 0.3 mile north of old log cabin; iron post stamped "2277 T".....	2,277.626
T. 7 N., R. 12 E., NW. $\frac{1}{4}$ sec. 35, Bacon Creek, 1.7 miles south of, 300 feet southeast of two old cabins, at junction of two trails; iron post stamped "2016 T".....	2,016.564
Glenwood, 125 feet east of Bowen, Bertchi & Co. store, 50 feet west of Shaw's hotel, in northwest corner of Shaw's lot; iron post stamped "1896 T".....	1,896.553

## Zillah Quadrangle.

## KLICKITAT AND YAKIMA COUNTIES.

The elevations in the following list are based on a precise-level line of the Coast and Geodetic Survey along the Northern Pacific Railway within this area.

The leveling here given includes elevations on the precise-level line and also the work of 1898 by H. S. Crowe along the Northern Pacific Railway, the work of 1906 by G. Neuner, jr., and F. E. Fellows, and some by the United States Reclamation Service.

## ZILLAH QUADRANGLE.

## United States Reclamation Service levels.

## LINE FROM HEADWORKS SUNNYSIDE CANAL ALONG LOWER SIDE CANAL TO PROSSER.

Parker bottom, 1.5 miles northeast of, along canal fence, lower side canal, 200 feet west of corner made by fence intersecting canal fence, near center of sec. 8, T. 11 N., R. 20 E.; iron post stamped "896 T".....	Feet. 896.295
T. 11 N., R. 20 E., sec. 16, along canal fence, 200 feet west of intersection of section line fence between secs. 15 and 16 and canal line fence at Crook place; iron post stamped "887 T".....	887.321
T. 11 N., R. 20 E., sec. 23, along lower side canal along canal fence, 2.5 miles northwest of Zillah, 900 feet north of road intersecting canal road, at Rowland place; iron post stamped "883 T".....	883.226
T. 11 N., R. 20 E., northeast corner of sec. 25, 1.5 miles north of Zillah, 0.25 mile east of Mason's hop house, corner of fence made by cross fence and canal fence; iron post stamped "890 T".....	890.268
T. 11 N., R. 21 E., on line between secs. 30 and 31, 1.5 miles east of Zillah, at point where section line intersects canal fence 200 feet up canal from wagon bridge, across canal; iron post stamped "887 T".....	887.187
T. 11 N., R. 21 E., sec. 33, 3 miles east of Zillah, 800 feet north along fence from corner in front of Foulth house, at intersection of fence with canal fence; iron post stamped "872 T".....	872.237
T. 10 N., R. 21 E., 2.4 feet east of section line of secs. 2 and 3, 5 miles east of Zillah, 800 feet west of R. W. Moor house, along canal fence, road intersects canal road at this point; iron post stamped "862 T".....	862.175
T. 10 N., R. 21 E., sec. 1, 2.5 miles west of patrol house 3, 1,000 feet north of fence on section line between secs. 1 and 2 at intersection of road with canal road, 50 feet from canal bank; iron post stamped "864 T".....	864.184
T. 10 N., R. 22 E., 400 feet west of line between secs. 8 and 9, patrol house 3, Snipe's Mountain lateral 50 feet from canal on right-hand side gate, 100 feet west of patrol house; iron post stamped "852 T".....	852.115
T. 10 N., R. 22 E., 100 feet east of half-mile line in sec. 14, 3 miles northwest of Sunnyside, at Mrs. Schlosser place, 60 feet north of house; iron post stamped "851 T".....	851.171

## ALFALFA ON MAIN LINE NORTHERN PACIFIC RAILWAY TO SUNNYSIDE VIA SUNNYSIDE BRANCH, THENCE ALONG RANGE LINE BETWEEN RANGES 22 AND 23 TO MABTON.

T. 10 N., Rs. 21 and 22 E., sec. 24, 25 feet west of range line, 3.25 miles east of Granger, along Sunnyside branch Northern Pacific Railway, 18 feet west of nearest rail, 3 feet east of corner of right-of-way fence, 6 feet west of signboard, 25 feet east of north-south road; iron post stamped "756"...	755.825
Outlook, 1.2 miles east of, 260 feet east of center of Snipe's Mountain lateral where lateral siphons under Northern Pacific Railway, 18 feet south of nearest rail, 5 feet west of second telephone pole east of Snipe's Mountain lateral where it siphons under Northern Pacific Railway; iron post stamped "781".....	781.284
Sunnyside, 11 feet northeast of northeast corner of Northern Pacific Railway station, 11 feet south of northeast rail, main track, 5 feet from corner of platform; iron post stamped "747".....	747.068

## ALFALFA WEST TO RANGE 18 EAST.

T. 10 N., R. 20 E., southwest corner of sec. 23, about 150 feet northwest of Meyer place, 4 feet east of northeast corner fence post, 34 feet east of slough, inside fence corner; iron post stamped "729".....	728.748
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T. 10 N., R. 20 E., quarter corner west side of sec. 29, 2½ feet north of fence north side of road, 5 feet east of fence post, 225 feet west of dry ditch crossing road, southwest of P. L. Jensen place; iron post stamped "741".....	Feet. 741. 235
T. 10 N., R. 10 E., southwest corner of sec. 23, inside northeast fence corner; iron post stamped "757".....	757. 022
T. 10 N., R. 19 E., 64 feet southwest of northeast corner of sec. 19, 63 feet southwest of bridge over lateral "A", 54 feet west of lateral, 54 feet south of road; iron post stamped "778".....	778. 323

UNITED STATES GEOLOGICAL SURVEY AND COAST AND GEODETIC SURVEY BENCH MARKS ALONG  
NORTHERN PACIFIC RAILWAY.

Wapato, 1,600 feet west of Northern Pacific Railway station, 150 feet north of railroad track, 6 feet west of corner northern boundary railroad company's right-of-way fence, south of wagon road, 1 foot south of northern boundary railroad company's fence; iron post stamped "861".....	861. 130
Wapato, in Alexander E. McCredy's yard, 9.05 meters west of house, 8.6 meters south of front fence, about 19 meters east of his store; iron bench-mark post (Coast and Geodetic Survey bench mark E-2).....	853. 658
Wapato, about 4.5 kilometers east of, in upper surface of south end of east concrete abutment for Northern Pacific Railway bridge 77 over irrigation ditch, 0.2 meter from west and south edge of abutment, 1.5 meters south of nearest rail; tablet (Coast and Geodetic Survey bench mark F-2).....	812. 594
Toppenish, 32.9 meters east of Northern Pacific Railway station, 6.85 meters south of nearest rail of main track, very near northeast corner of little park east of station; iron post stamped "755 T".....	755. 427
Toppenish, 21.07 meters west of northwest corner of section house, about 1 meter inside fence inclosing yard, 11.34 meters south of nearest rail of main track; iron bench-mark post (Coast and Geodetic Survey bench mark G-2).....	754. 101
Toppenish, in upper surface of concrete foundation supporting pillars for Northern Pacific Railway water tank, under northern one of two western pillars, 0.3 meter north of south edge, 0.25 meter from east edge, 7 meters north of nearest rail of main track; copper bolt set without lead marked $\frac{U}{B} \frac{S}{M}$ (Coast and Geodetic Survey bench mark H-2).....	756. 027
Alfalfa, at first wagon road crossing over railroad west of siding, about 0.8 kilometer west of milepost 66, 0.9 meter east of fence for road crossing, 13 meters south of nearest rail; iron post stamped "717 T".....	716. 689
Alfalfa, 6.2 meters west of milepost 66, 1.75 meters east of telegraph pole, in line with telegraph poles, 14.67 meters south of nearest rail of main track; iron bench-mark post (Coast and Geodetic Survey bench mark I-2).....	714. 462
Satus, 14 meters west of northwest corner of station, 9.85 meters south of nearest rail of main track; iron post stamped "674 T".....	673. 995
Satus, about 0.9 kilometer east of, 1.78 meters west of second telegraph pole east of milepost 60, 10.89 meters south of nearest rail in line with telegraph poles; iron bench-mark post (Coast and Geodetic Survey bench mark J-2).....	668. 774
Mabton, near, nearly opposite milepost 56, 36 meters south of nearest rail, 2.8 meters north of railway fence; iron post stamped "717 T".....	716. 361
Mabton, 16.5 meters east of southeast corner of Northern Pacific Railway section house, just outside of section house yard fence, 9.75 meters north of nearest rail of main track; iron post stamped "715 T".....	715. 206



## HEADWORKS OF SUNNYSIDE CANAL EAST VIA MOUNTAIN ROAD TO POINT NEAR SUNNYSIDE.

T. 12 N., R. 19 E., sec. 28, 150 feet east of gatehouse of head works of Sunnyside Canal; iron post stamped "914 T" (United States Reclamation Service bench mark) .....	Feet. 914. 489
T. 11 N., R. 19 E., northeast corner of Dunn's bridge and weir; iron post stamped "891 T" (United States Reclamation Service bench mark) .....	891. 344
T. 12 N., R. 20 E., 3 miles northeast of, on summit, highest part in saddle of junction of Yakima and Moxee wagon road, in rock 4 feet east of 3-foot cairn; aluminum tablet stamped "1324 T" .....	1, 324. 183
T. 12 N., R. 20 E., sec. 35, highest ridge on route, about 1 mile south of divide between Yakima and Moxee road; iron post stamped "1596 T" ..	1, 595. 933
T. 11 N., R. 21 E., northeast quarter of, 600 feet east of Zillah and Moxee road, about 1 mile north of and on same ridge as Hovis ranch, probably section line; iron post stamped "1335 T" .....	1, 335. 058
T. 11 N., R. 22 E., southwest corner of sec. 21, 15 feet north of old State road, 20 feet east of corner of fence; top of rock in road; iron post stamped "1068" .....	1, 068. 205
T. 11 N., R. 22 E., SW. $\frac{1}{4}$ sec. 35, about 3 miles north of Mrs. Schlosser place on Sunnyside Canal, 30 feet north of old State road; iron post stamped "1089" .....	1, 089. 080
Old State road, 0.8 mile south of, about 0.5 mile northeast of small blue house, conical rock; marked "1037" .....	1, 037. 17

## HOVIS RANCH NORTHEAST OVER RATTLESNAKE MOUNTAIN TO MOXEE-RATTLESNAKE DIVIDE.

Yakima and Moxee road junction, on summit 11.12 miles east of, 600 feet east of Zillah and Moxee road, about 1 mile north and on same ridge as Hovis ranch, probably section line; iron post stamped "1335 T" .....	1, 335. 058
T. 11 N., R. 21 E., sec. 2, summit of saddle Rattlesnake Mountain, 30 feet west of road; iron post stamped "2118" .....	2, 118. 078
T. 12 N., R. 22 E., SW. $\frac{1}{4}$ sec. 20, Moxee and Rattlesnake divide, 0.2 mile southwest of white house, 0.3 mile northwest of new house, 160 feet north of road, top of small hill; iron post stamped "1803" .....	1, 803. 056

## SATUS WEST TO R 19 E., THENCE SOUTH INTO T. 6 N., THENCE EAST TO BICKLETON.

Satus, 26 feet southwest of southwest corner of platform of station, 30 feet south of center of track, 2.5 feet north of first telegraph pole south of station (station has been moved about 800 feet north); iron post stamped "674 T" .....	673. 995
T. 9 N., R. 21 E., east of center of sec. 9, on Satus Creek road, about 0.5 mile west of house, in corner of fence, road turns around corner; iron post stamped "697" .....	697. 009
T. 9 N., R. 20 E., 0.25 mile north by 150 feet east of southwest corner of sec. 11, 0.5 mile north of Indian Tulce house, 150 feet south of junction of roads, 3-foot monument at base of rock, in rock; aluminum tablet stamped "847" .....	846. 773
T. 9 N., R. 20 E., 500 feet south of quarter corner north side of sec. 20, 150 feet above water on north cliff, 1,000 feet south of trail, in large flat rock; aluminum tablet stamped "996" .....	996. 116
Satus station, 13.4 miles west of, near rock monument, probably township line, 100 feet south of trail, on rock marked "1090 B. M." .....	1, 089. 87
T. 9 N., R. 19 E., sec. 23, Goldendale wagon road crossing Dry Creek, 200 feet north by 20 feet west of junction of roads; iron post stamped "961" ..	960. 931
Goldendale road crossing Satus Creek, 20 feet east of, 6-inch spike in knuckle of willow tree; marked "977 U. S." .....	976. 77
T. 9 N., R. 19 E., SW. $\frac{1}{4}$ sec. 34, Goldendale road crossing Satus Creek, 1.5 miles west of, 30 feet south of road, 100 feet southeast of gate to Billy Shannon place, in rock; aluminum tablet stamped "1054" .....	1, 053. 527

T. 8 N., R. 19 E., SE. $\frac{1}{4}$ sec. 6, 3.8 miles west of, Satus Creek road crossing, junction of Goldendale and Bickleton roads, junction of Satus and Logy creeks, 50 feet south of road, 200 feet south of green house; iron post stamped "1145".....	Feet. 1, 144. 755
T. 8 N., R. 19 E., sec. 20, 100 feet east of road, in solid rock, 4-foot monument at base; aluminum tablet stamped "2039".....	2, 038. 659
T. 7 N., R. 19 E., sec. 4 (unsurveyed section), 40 feet west of road, edge of long draw; iron post stamped "2840".....	2, 840. 159
T. 7 N., R. 19 E., sec. 21, in junction of Alfalfa and Satus roads, about 1 mile northeast of pine spring, set on bed rock; iron post stamped "3170".	3, 170. 024
Alfalfa and Satus roads, junction of, 0.9 mile south of, 50 feet west of road, top of three-cornered rock; marked "U. S. 3268 B. M.".....	3, 268. 00
Alfalfa and Satus roads, junction of, 2.1 miles south of, 10 feet east of road, 6-inch spike in root of pine tree 3 feet in diameter; marked "U. S. 3477 B. M.".....	3, 477. 08
T. 6 N., R. 19 E., SW. $\frac{1}{4}$ sec. 5, on main divide, 15 feet west of road, in rock; aluminum tablet stamped "3901".....	3, 900. 939
T. 6 N., R. 19 E., sec. 16, McCreedy sawmill, 0.3 mile west of, 20 feet north of road in small open glade; iron post stamped "3627".....	3, 626. 754
T. 6 N., R. 19 E., near west side of sec. 12, McCreedy sawmill, 2.5 miles east of, 20 feet south of road, 30 feet southeast of box culvert, east side of drain, top of rock ledge; aluminum tablet stamped "3544".....	3, 543. 779
T. 6 N., R. 20 E., near quarter corner east side of sec. 8, 0.4 mile southeast of ranch house, 80 feet west of forks of road, south side of road, top of boulder 2 by 4 by 1 feet; aluminum tablet stamped "3212".....	3, 211. 642

## BICKLETON NORTHEAST TO MABTON.

T. 6 N., R. 20 E., south side of SW. $\frac{1}{4}$ sec. 2, 0.5 mile west of forks of road, northwest corner, Ostrick ranch house; iron post stamped "3017".	3, 016. 741
T. 7 N., R. 21 E., north side of NW. $\frac{1}{4}$ sec. 31, Donoho ranch house, 1.6 miles southwest of, 70 feet south of forks of road, east side of road, 4 feet south of signpost, at top of ridge; iron post stamped "2996".....	2, 995. 578
T. 7 N., R. 21 E., east side of sec. 20, 0.8 mile northeast of Donoho ranch house, at southern boundary of Yakima Indian Reservation, top of ridge, 40 feet west of wagon road; iron post stamped "2806".....	2, 805. 756
T. 7 N., R. 21 E., about sec. 21 (unsurveyed section), 3.9 miles northeast of Donoho ranch house, 0.4 mile north of cabin, 200 feet east of road near top of rocky hill, in top of boulder 5 by 2 by 2 feet; aluminum tablet stamped "1878".....	1, 877. 480
T. 8 N., R. 21 E., about sec. 34 (unsurveyed section), 10.1 miles southwest of Mabton, 20 feet west of road, 500 feet west of ravine, 300 feet east of ravine, north point of ridge; iron post stamped "1281".....	1, 280. 633
T. 8 N., R. 22 E., SW. $\frac{1}{4}$ sec. 18, 6.5 miles southwest of Mabton, 20 feet east of road, 70 feet east of drain; iron post stamped "879".....	879. 077
T. 8 N., R. 22 E., in SE. $\frac{1}{4}$ sec. 9, 3.3 miles southwest of Mabton, 30 feet north of road; iron post stamped "794".....	793. 584
Mabton, at water tank, 2 feet east of fence around railroad section house, 35 feet north of center of track, 45 feet west of center line of wagon road at railroad crossing; iron post stamped "715 T".....	715. 206

## CAMPBELL RANCH EAST TO SEC. 4, T. 6 N., R. 22 E., THENCE NORTH 3 MILES, THENCE WEST TO DONOHO RANCH.

T. 6 N., R. 21 E., center of sec. 5, 1.8 miles southwest of forks of road, Bluelight, 30 feet east of gate, south side of wire fence, in field; iron post stamped "2809".....	2, 808. 644
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T. 6 N., R. 21 E., near east side of sec. 2, 2.2 miles east of Bluelight, 0.4 mile south of road and county line, 0.1 mile north of house, wire fence 300 feet west of canyon; iron post stamped "2585".....	Feet. 2, 584. 619
T. 6 N., R. 22 E., 0.4 mile southeast of northwest corner of sec. 5, 0.3 mile southeast of Kimball ranch house, 150 feet east of bottom of canyon, 1,000 feet east of cabin, east side of canyon, top of ledge of rock; aluminum tablet stamped "2218".....	2, 217. 560
T. 6 N., R. 22 E., 25 feet northwest of SE. $\frac{1}{4}$ sec. 3, 8 feet east of road, L. E. Roberts ranch house, near wire fence; iron post stamped "1945".....	1, 944. 551
T. 7 N., R. 22 E., 50 feet northwest of southeast corner of sec. 21, 0.8 mile northwest of Franklin ranch house, west side of road, near wire fence; iron post stamped "2247".....	2, 246. 541
T. 7 N., R. 21 E., near northeast corner of sec. 25, 0.8 mile east of C. Muller ranch house, 50 feet west of forks of road, south side of road, 10 feet west of wire fence corner; iron post stamped "2587".....	2, 586. 489
T. 7 N., R. 21 E., SW. $\frac{1}{4}$ sec. 22, 350 feet northeast of L. Spencer ranch house, 80 feet south of road, 10 feet south of wire fence, in top of rock ledge; aluminum tablet stamped "2619".....	2, 618. 386

SEC. 4, T. 6 N., R. 22 E., SOUTHEAST TO SAPPENFIELD RANCH AND RETURN.

T. 6 N., R. 22 E., 3 feet north of southeast corner of sec. 11, 0.3 mile southeast of W. B. Sappenfield ranch house, 20 feet north of road; iron post stamped "1637".....	1, 636. 308
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**Blalock Island, Prosser, and Umatilla Quadrangles.**

**BENTON AND KLICKITAT COUNTIES.**

The elevations are based upon corrected heights along the Oregon Railroad & Navigation Co.'s railroad on a double-rodged line, run in 1899 by H. S. Crowe. The original results of that line were published in the appendix to the Twenty-first Annual Report, and the new adjustment consisted, first, in applying a mean rod correction of 0.001 foot per vertical foot increasing differences of elevation, a correction determined by comparison with the Coast and Geodetic Survey elevations south of Pendleton, Oreg.; second, in adjusting a remaining closure error of 1.4 foot from Wallula, Wash., via Umatilla to Pendleton, Oreg., and third, in raising the line between Arlington and Umatilla to an agreement without additional adjustment.

A tie is made to a bench mark in the Zillah list given as 1,636.308, a value determined by leveling based upon the Coast and Geodetic Survey precise line which crosses the Zillah quadrangle. The corrected value obtained from the south is 1,635.299 feet, a discrepancy of 1.009 feet.

The leveling in the Blalock Island and Prosser quadrangles was done in 1906 by John R. Evans, and that in the Umatilla quadrangle in 1907 by T. J. McClain.

## BLALOCK ISLAND QUADRANGLE.

MILEPOST 177 NORTH BY ROAD CROSSING RIVER TO PATERSON, AND THENCE TO MOUTH OF GLADE CREEK AND NORTHWEST TO DEAD CANYON 9 MILES NORTH OF CARLEY, SOUTH TO CARLEY, THENCE ACROSS RIVER TO CASTLEROCK.

T. 5 N., R. 26 E., sec. 10, southwest corner of, 1.7 miles east of Paterson, 160 feet south of railroad embankment, east edge of road; iron post stamped "263" .....	Feet. 263. 923
T. 5 N., R. 25 E., sec. 13, in NE. $\frac{1}{4}$ , unsurveyed, 1.77 miles west of Paterson, 100 feet south of center of railroad embankment, 250 feet north of road, in firm rock on rocky point; aluminum tablet stamped "267" .....	267. 748
T. 5 N., R. 25 E., about sec. 21, unsurveyed, 5.21 miles west of Paterson, 100 feet south of railroad cut, 30 feet north of road, in firm rock; aluminum tablet stamped "260" .....	261. 169
T. 5 N., R. 25 E., about sec. 30, unsurveyed, 8.41 miles west of Paterson, 0.3 mile east of high hill, on ridge, in large boulder; aluminum tablet stamped "622" .....	623. 365
T. 5 N., R. 24 E., about sec. 16, unsurveyed, 6.04 miles east of Carley and Prosser road, on flat; iron post stamped "483" .....	483. 865
T. 5 N., R. 24 E., about northeast corner sec. 18, unsurveyed, 4 miles east of Carley and Prosser roads, on round knoll, 600 feet north of Dead Canyon, in firm granite rock, near a rock mound; aluminum tablet stamped "576" .....	576. 872
T. 5 N., R. 23 E., east side of SE. $\frac{1}{4}$ sec. 10, 6.94 miles north of Carley, 500 feet north of Hansen's store, 25 feet west of road; iron post stamped "734" .....	734. 955
T. 5 N., R. 23 E., north side of NW. $\frac{1}{4}$ sec. 26, 4.6 miles north of Carley, 2.3 miles south of Hansen's store, 20 feet west of road, on fence line; iron post stamped "656" .....	657. 044
T. 4 N., R. 23 E., W. $\frac{1}{2}$ sec. 1, 1.77 miles northwest of Carley; east of summit, 20 feet north of road; iron post stamped "705" .....	706. 044
Castlerock, T. 4 N., R. 24 E., NW. $\frac{1}{4}$ sec. 8, north bank of river, opposite rock, 100 feet north of river, 30 feet north of shack at ferry landing; aluminum tablet stamped "247" .....	248. 049

MOUTH OF GLADE CREEK NORTH AND EAST BY ROAD TO POINT 3.6 MILES NORTHWEST OF IRRIGON TRIANGULATION STATION, THENCE EAST AND SOUTH TO POINT 1.7 MILES EAST OF PATERSON.

T. 5 N., R. 25 E., sec. 9, unsurveyed, 3.3 miles northeast of, 20 feet east of Prosser Glade road, in east fork of Glade Canyon; iron post stamped "362" ..	362. 997
T. 6 N., R. 25 E., about sec. 35, unsurveyed, 5.92 miles northeast of Glade, 20 feet east of Prosser and Glade road; iron post stamped "511" .....	512. 086
Irrigon triangulation station, T. 6 N., R. 26 E., NW. $\frac{1}{4}$ sec. 34, 3 miles north of Holmes ranch, on high ridge 0.25 mile east of Prosser and Irrigon road; iron post stamped "738" .....	739. 477

POINT 9 MILES NORTH OF CARLEY NORTH 1 MILE, THENCE NORTH 2 MILES TO SOUTHWEST CORNER OF SEC. 7, T. 6 N., R. 24 E.

T. 6 N., R. 23 E., northwest corner of sec. 35, 30 feet southeast of, 13 miles north of Carley, at crossroads; iron post stamped "793" .....	793. 972
T. 6 N., R. 23 E., northeast corner of sec. 25, 10.1 miles north of Carley, 500 feet west of intersection of two roads, 30 feet west of section corner west edge of road; iron post stamped "865" .....	866. 028

POINT 9 MILES NORTH OF CARLEY NORTHWEST TO SOUTHEAST CORNER OF SEC. 11, T. 6 N., R. 22 E.

T. 6 N., R. 23 E., north side of sec. 29, 3 miles west of Carley Prosser road at intersection of two gulches, 500 feet west of schoolhouse, in rocky point, in firm rock; aluminum tablet stamped "990" .....	990. 519
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## PROSSER QUADRANGLE.

T. 6 N., R. 26 E., SEC. 18.

T. 6 N., R. 26 E., sec. 18, 9.6 miles northeast of Glade, 15 feet north of bend in road, at line fence; iron post stamped "716".....	Feet. 717. 074
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## SAPPENFIELD RANCH EAST 7 MILES TO CROSSROADS.

T. 6 N., R. 23 E., sec. 9, 30 feet northwest of quarter corner, south side of, 3.5 miles east of Sappenfield ranch house, at intersection of two roads; iron post stamped "1231".....	1, 231. 954
T. 6 N., R. 24 E., 30 feet northeast of southwest corner of sec. 7, 7 miles east of Sappenfield ranch house; at crossroads iron post stamped "897".....	897. 911

## UMATILLA QUADRANGLE.

COLD SPRINGS, OREG., ACROSS COLUMBIA RIVER NORTH TO SEC. 26, T. 6 N., R. 29 E., THENCE WEST TO IRRIGON TRIANGULATION STATION, T. 6 N., R. 26 E.

T. 5 N., R. 29 E., near quarter corner of secs. 2 and 11, 0.25 mile east of Mottinger ranch, in road forks at mouth of canyon; iron post stamped "329".....	329. 758
T. 6 N., R. 29 E., northwest part of sec. 26, 2.4 miles northwest of Mottinger ranch, on west side of road; iron post stamped "869".....	869. 618
T. 6 N., R. 29 E., near quarter corner secs. 29 and 30, 6.6 miles northwest of Mottinger ranch, east side of road to Siding; iron post stamped "859".....	859. 232
Expansion triangulation station, 3 miles northeast of Umatilla, T. 6 N., R. 28 E., center of sec. 33, in rock; tablet stamped "1016".....	1, 016. 512
T. 6 N., R. 28 E., 2.5 miles northeast of Plymouth, 0.85 mile west of road; iron post stamped "589".....	589. 662
T. 6 N., R. 27 E., corner of secs. 26, 27, 34, and 35, 3.5 miles northwest of Plymouth, 20 feet east of Umatilla and Prosser road; iron post stamped "570".....	570. 252
Kings ranch, 4 miles northwest of, 20 feet west of old wood road; iron post stamped "608".....	608. 270

## Portland Quadrangle (Oreg.-Wash.).

## CLARKE COUNTY.

The elevations in the following list were determined by primary leveling connected at Portland, Oreg., with a double-rodged line from Astoria, Oreg. Elevations in Oregon in this quadrangle are not included.

The leveling was done in 1896 by C. C. Ward.

## PORTLAND QUADRANGLE.

## UNITED STATES MILITARY RESERVATION AT VANCOUVER.

Columbia River, north bank, in Chinese vegetable garden east of Vancouver, cottonwood stump 14 inches in diameter; head of nail.....	Feet. 17. 7
Reservation, northwest corner of; top of stone post 8 by 8 inches and 3 feet high.....	28. 3
Quartermaster and commissary buildings, 6.9 feet south of hexagonal building and 70 feet from adjoined front corner of; iron post stamped "26"....	28. 376
VANCOUVER NORTHEAST ALONG VANCOUVER, KLICKITAT & NORTHERN RAILROAD TO BRUSH PRAIRIE.	
Vancouver, in base of stone column at right of main entrance to Clarke County courthouse; bronze tablet stamped "73".....	75. 009

Minnehaha siding, about 60 feet west of, 8 feet west of railroad track and 8 feet north of wagon road crossing, in root of fir stump 27 inches in diameter; head of nail.....	Feet. 249. 7
T. 2 N., R. 2 E., sec. 6, road crossing in, 10 feet southeast of railroad at road crossing, in fir stump 36 inches in diameter; head of nail.....	283. 5
Thornton ranch, in sec. 32, T. 3 N., R. 2 E., in northeast corner of cattle guard at road crossing; head of spike.....	206
Brush Prairie post office, 40 feet north of railroad and 100 feet west of Battle Ground road, in fir stump 36 inches in diameter; head of nail.....	294. 8

## BRUSH PRAIRIE SOUTH TO FISHERS LANDING, THENCE WEST TO VANCOUVER.

T. 3 N., R. 2 E., corner of secs. 13, 14, 23, and 24, 50 feet from, in fence corner at southeast angle of road intersection; iron post stamped "299"...	300. 639
T. 3 N., R. 2 E., corner of secs. 25, 26, 35, and 36, 10 feet west of road and 40 feet south of Union schoolhouse road, in root of fir stump; head of nail.....	278.
T. 2 N., R. 2 E., sec. 11, at northwest angle of road intersection near west side, 21 feet west of Donation Claim corner; iron post stamped "218"...	219. 865
T. 2 N., R. 2 E., near center of sec. 12, 10 feet north of forks of road, in fir tree 28 inches in diameter; head of nail.....	212. 3
T. 2 N., R. 2 E., quarter corner between secs. 24 and 25, 102 feet from house, in fence corner at southwest angle of crossroads; iron post stamped "303"...	305. 314
T. 2 N., R. 2 E., in sec. 19, at southeast angle of intersection with La Camas road; iron post stamped "206".....	207. 736
T. 2 N., R. 2 E., on north side of road, 75 feet west of crossroads, in top of fir stump 16 inches in diameter; head of nail.....	179. 7
United States water tank, at southwest corner of forks of road, in root of fir stump 2 feet in diameter; head of nail.....	177

## VANCOUVER NORTH ALONG RIVER ROAD TO SALMON CREEK, THENCE EAST TO BRUSH PRAIRIE.

Burntbridge Creek, near quarter corner on line between secs. 4 and 9, T. 2 N., R. 1 E., in southwest angle of first crossroads north of creek, in root of fir stump 36 inches in diameter; head of nail.....	39. 4
Secrist schoolhouse, sec. 4, T. 2 N., R. 1 E., in corner of yard, 2.5 feet from fence and 60 feet from corner of schoolhouse, at forks of road; iron post stamped "212".....	213. 796
T. 3 N., R. 1 E., corner of secs. 28, 29, 32, and 33, north of road forks, in fir stump 36 inches in diameter; head of nail.....	200. 9
Felida post office, 1 mile north of, near southeast corner of sec. 20, T. 3 N., R. 1 E., 25 feet from mudsill at north end of trestle over Salmon Creek and 10 feet from mudsill at west end of short trestle, east of road at north end of trestle; iron post stamped "36".....	38. 339
Salmon Creek schoolhouse, 160 feet from, in sec. 26, T. 3 N., R. 1 E., in orchard, 2 feet from fence and 18 feet from fence corner, at southeast angle of crossroads; iron post stamped "194".....	196. 173
St. John's Church, 0.75 mile west of, at fence corner near forks of road, in root of fir tree 3 feet in diameter; head of nail.....	261. 03
St. John's Church, east of road and north of second-class road turning off to east through gate, in root of partially decayed stump; head of nail.....	262. 37
T. 3 N., R. 2 E., corner of secs. 29, 30, 31, and 32, in Curtin's yard, 150 feet from fence corner and 6.2 feet from fence, 4 feet east of walk, and 116 feet from door of house, in northeast angle of forks of road; iron post stamped "232".....	233. 753
T. 3 N., R. 2 E., northeast corner of sec. 32, north of road, 100 feet south of crossroads, in root of oak tree 14 inches in diameter; head of nail.....	201. 076



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DEPARTMENT OF THE INTERIOR  
UNITED STATES GEOLOGICAL SURVEY

GEORGE OTIS SMITH, DIRECTOR

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BULLETIN 458

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RESULTS OF SPIRIT LEVELING  
IN  
ARKANSAS, LOUISIANA, AND MISSISSIPPI  
1896 TO 1909, INCLUSIVE

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R. B. MARSHALL, CHIEF GEOGRAPHER

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WORK IN LOUISIANA FROM 1903 TO 1909, INCLUSIVE, AND IN  
MISSISSIPPI FROM 1901 TO 1909, INCLUSIVE, DONE  
IN COOPERATION WITH RESPECTIVE STATES



WASHINGTON  
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GEOLOGICAL SURVEY BENCH MARKS.

*A.* Tablet used in cooperating States. The State name is inserted at *G*.  
*B* and *D.* Copper temporary bench mark, consisting of a nail and copper washer.  
*A*, *C*, and *E.* Tablets for stone or concrete structures.  
*F.* Iron post used where there is no rock.

# RESULTS OF SPIRIT LEVELING IN ARKANSAS, LOUISIANA, AND MISSISSIPPI, 1896 TO 1909, INCLUSIVE.

R. B. MARSHALL, Chief Geographer.

## INTRODUCTION.

*Scope of the work.*—All results of spirit leveling in these States previously published by the United States Geological Survey and all later work are included in this report, rearranged by quadrangles. All elevations are based on the precise-level net as adjusted in 1907 by the Coast and Geodetic Survey to a common mean sea-level datum. The net of precise-level lines, beside the lines of the United States Geological Survey described in this bulletin, which lie within or along the borders of these States, comprises the line of the Coast and Geodetic Survey from Arkansas City via Van Buren to Garfield, Ark., and from Greenville, Miss., to Vicksburg, Miss.; also lines of the Corps of Engineers, U. S. Army, along Mississippi River and in southern Arkansas and northern Louisiana.

*Personnel.*—The field work previous to 1903 was done under the general direction of J. H. Renshawe, geographer; that for 1903 to 1906, inclusive, under H. M. Wilson, geographer; and the later work in Arkansas under W. H. Herron, geographer, and in Louisiana and Mississippi under Frank Sutton, geographer, both under the general direction of R. B. Marshall, chief geographer. The names of the various levelmen are given in the introduction to each list. The office work of computation, adjustment, and preparation of lists was done mainly by S. S. Gannett, geographer, and D. H. Baldwin, topographer, and since 1907 under the general direction of E. M. Douglas, geographer.

*Classification.*—The elevations are classified as precise or primary, according to the methods employed in their determination. For precise lines instruments and rods of the highest grade are used, each line is run both forward and backward, and every precaution is taken to guard against error. The allowable divergence between the forward and the backward lines in feet is  $0.017 \sqrt{D}$ , in which  $D$  is the distance between bench marks in miles. For primary lines standard Y levels are used; lines are run in circuits or are closed on precise lines, with an allowable closing error in feet of  $0.05 \sqrt{D}$ , in which  $D$  is the length of the circuit in miles, sufficient care being given the work to maintain this standard. For levels of both classes careful office



adjustments are made, the small outstanding errors being distributed over the lines.

**Bench marks.**—The standard bench marks are of two forms. The first form is a circular bronze or aluminum tablet (*C* and *E*, Pl. I),  $3\frac{1}{2}$  inches in diameter and one-quarter inch thick, having a 3-inch stem, which is cemented in a drill hole in solid rock, in the wall of some public building, bridge abutment, or other substantial masonry structure. The second form (*F*, Pl. I), to be set in the ground where no masonry or rock is available, consists of a hollow wrought-iron post  $3\frac{1}{2}$  inches in outside diameter and 4 feet long. The bottom is spread out to a width of 10 inches in order to give a firm bearing on the earth. A bronze or aluminum-bronze cap is riveted over the top of the post. A third style of bench mark with abbreviated lettering (*B* and *D*, Pl. I) is used for unimportant points. This consists of a special copper nail  $1\frac{1}{2}$  inches in length driven through a copper washer seven-eighths inch in diameter. The tablets as well as the caps on the iron posts are appropriately lettered, and for cooperating States the fact of such cooperation is indicated by the addition of the State name (at *G*, Pl. I). The numbers stamped on the bench marks described in the following pages are the elevations to the nearest foot as determined by the levelman. These numbers are stamped with  $\frac{1}{8}$ -inch steel dies on the tablets or post caps to the left of the word "feet." The office adjustment of the notes and the reduction to mean sea-level datum may so change some of the figures that the original markings are 1 or 2 feet in error. It is assumed that engineers and others who have occasion to use the bench-mark elevations will apply to the Director of the United States Geological Survey, at Washington, D. C., for their adjusted values, using the markings as identification numbers only.

**Datum.**—All Geological Survey elevations are referred to mean sea level, which is the level that the sea would assume if the influence of winds and tides were eliminated. This level is not the elevation determined from the mean of the highest and the lowest tides, nor is it the half sum of the mean of all the high tides and the mean of all the low tides, which is called half-tide level. *Mean sea level is the average height of the water, all stages of the tide being considered.* It is determined from observations made by means of tidal gages placed at stations where local conditions, such as long, narrow bays, rivers, and like features will not affect the height of the water. To obtain even approximately correct results these observations must extend over at least one lunar month, and if great accuracy is desired they must extend over several years. At ocean stations the half-tide level and mean sea level usually differ but little. It is assumed that there is no difference between the mean sea level as determined from observations in the Atlantic Ocean, the Gulf of Mexico, or the Pacific Ocean.

The connection with tidal stations for bench marks in certain areas that lie at some distance from the seacoast is still uncertain, and this fact is indicated by the addition of a letter or a word to the right of the word "DATUM" on tablets or posts. For such areas corrections for published results will be made from time to time as the precise-level lines of the United States Geological Survey or other Government organizations are extended.

*Topographic maps.*—Maps of the following quadrangles wholly or partly in Arkansas, Louisiana, and Mississippi have been published by the United States Geological Survey up to May 1, 1911. They may be obtained for 5 cents each or \$3 a hundred on application to the Director of the Survey at Washington, D. C.

## ARKANSAS.

Atlanta (Tex.-Ark.-La.).  
Batesville.  
Benton.  
Caddo Gap.  
Camden.  
Dardanelle.  
Eureka Springs (Ark.-Mo.).  
Fayetteville (Ark.-Mo.).  
Fort Smith (Ark.-Okla.).  
Gurdon.  
Harrison (Ark.-Mo.).  
Hot Springs.  
Hot Springs special.

Little Rock.  
Magazine Mountain.  
Marshall.  
Morrilton.  
Mountain Home (Ark.-Mo.).  
Mountain View.  
Mount Ida.  
Poteau Mountain (Ark.-Okla.).  
Siloam Springs (Okla.-Ark.).  
Tahlequah (Okla.-Ark.).  
Texarkana (Tex.-Ark.).  
Winslow (Ark.-Okla.).  
Yellville (Ark.-Mo.).

## LOUISIANA.

Atlanta (Tex.-Ark.-La.).  
Barataria.  
Baton Rouge.  
Bayou de Large.  
Bayou Sara.  
Bodreau.  
Bonnet Carre.  
Cat Island (La.-Miss.).  
Chandeleur.  
Chef Menteur.  
Cheniere Caminada.  
Creole.  
Cut Off.  
Dime.  
Donaldsonville.  
Dulac.  
East Delta.  
Fort Livingston.  
Forts.

Gibson.  
Hahnville.  
Houma.  
Lac des Allemands.  
La Fortuna.  
Lake Felicity.  
Mound.  
Mount Airy.  
New Orleans.  
Pointe a la Hache.  
Quarantine.  
Rigolets (La.-Miss.).  
St. Bernard.  
Shell Beach.  
Spanish Fort.  
Thibodaux.  
Timbalier.  
Toulme (La.-Miss.).  
West Delta.

## MISSISSIPPI.

Cat Island (La.-Miss.).  
Coahoma.  
Dundee.  
Florence.  
Jackson.

Jonestown.  
Rigolets (La.-Miss.).  
Toulme (La.-Miss.).  
Walnut Lake.

## ARKANSAS.

## PRIMARY LEVELING.

Eureka Springs, Fayetteville, Harrison, Siloam Springs, and Winslow quadrangles.

BENTON, BOONE, CARROLL, CRAWFORD, MADISON, NEWTON, AND WASHINGTON  
COUNTIES.

The elevations in the following list were determined by primary leveling extended from the precise-level line of the Coast and Geodetic Survey along the St. Louis & San Francisco Railroad, which crosses the Fayetteville, Eureka Springs, and Winslow quadrangles.

The leveling was done in the Eureka Springs quadrangle in 1900 by J. A. Boyd, G. E. Diehl, J. E. Smith, and C. C. Curry, and in 1902 by Boyd and D. V. Vandiver; in the Fayetteville and Siloam Springs quadrangles in 1899 by Clifford Older; in the Harrison quadrangle in 1902 by Vandiver; and in the Winslow quadrangle in 1898 by Robert Coe.

## FAYETTEVILLE QUADRANGLE.

## FAYETTEVILLE SOUTHEAST ALONG HIGHWAY TO BALDWIN (SINGLE SPUR LINE).

Fayetteville, in front wall of bank, northwest corner of courthouse square; aluminum tablet stamped "1425 FTVL".....	Feet. 1,426.741
Baldwin, sec. 20, T. 16 N., R. 29 W., southwest corner of section house yard; iron post stamped "1233 FTVL".....	1,234.979

## FAYETTEVILLE EAST TO HABERTON.

T. 17 N., R. 29 W., northwest corner of sec. 35; iron post stamped "1242 FTVL".....	1,244.004
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## FAYETTEVILLE WEST AND NORTH VIA FARMINGTON TO ROBINSON SCHOOLHOUSE, THENCE EAST TO SPRINGDALE.

Farmington, sec. 26, T. 16 N., R. 31 W., opposite church; iron post stamped "1202 FTVL".....	1,203.386
T. 17 N., R. 32 N. NE. $\frac{1}{4}$ sec. 11, at Robinson schoolhouse; iron post stamped "1082 FTVL".....	1,083.530
Elm Springs, near center of sec. 25, T. 18 N., R. 31 W.; iron post stamped "1167 FTVL".....	1,168.718

## SPRINGDALE EAST ALONG HIGHWAY 5 MILES (SINGLE SPUR LINE).

T. 18 N., R. 29 W., northwest corner of sec. 27, 250 feet west of church; iron post stamped "1399 FTVL".....	1,400.729
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## ROBINSON SCHOOLHOUSE SOUTHEAST ALONG HIGHWAY TO WHEELER (SINGLE SPUR LINE).

Wheeler, near northwest corner of sec. 28, T. 17 N., R. 31 W.; iron post stamped "1274 FTVL".....	1,275.490
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## ROBINSON SCHOOLHOUSE SOUTHWEST ALONG HIGHWAY TO CINCINNATI, THENCE NORTH VIA SILOAM SPRINGS ALONG HIGHWAY AND RAILROAD TO GRAVETTE, THENCE EAST TO ROGERS (PORTION OF LINE).

Wedington Gap, NE. $\frac{1}{4}$ sec. 5, T. 16 N., R. 32 W.; iron post stamped "1366 FTVL".....	1,367.747
Gravette, sec. 12, T. 20 N., R. 33 W., in northwest corner of stone building east of station; aluminum tablet stamped "1226 FTVL".....	1,227.528

T. 20 N., R. 32 W., SW. $\frac{1}{4}$ sec. 2, Banks' schoolhouse; iron post stamped "1287 FTVL".....	Feet. 1,288.021
Seba, in front of J. A. Corley's store; iron post stamped "1320 FTVL"....	1,321.138
Bentonville, northwest corner of new office building of courthouse; aluminum tablet stamped "1303 FTVL".....	1,304.909

## GENTRY (ORCHARD) EAST ALONG HIGHWAY TO SPRINGTOWN (SINGLE SPUR LINE).

Orchard, near center of sec. 3, T. 18 N., R. 33 W., 1 block west of public well; iron post stamped "1237 FTVL".....	1,238.649
Springtown, northwest corner of sec. 8, T. 18 N., R. 32 W.; iron post stamped "1259 FTVL".....	1,260.201

## DECATUR EAST ALONG HIGHWAY TO EAGLE SCHOOLHOUSE (SINGLE SPUR LINE).

Decatur, near northwest corner of sec. 13, T. 19 N., R. 33 W.; iron post stamped "1248 FTVL".....	1,249.446
T. 19 N., R. 32 W., northwest corner of sec. 26, Eagle schoolhouse; iron post stamped "1415 FTVL".....	1,416.520

## GRAVETTE NORTH ALONG HIGHWAY TO SULPHUR SPRINGS (SINGLE SPUR LINE).

Sulphur Springs, sec. 23, T. 21 N., R. 33 W., in east wall of Joplin's store, 4 feet above ground; aluminum tablet stamped "929 FTVL".....	930.383
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## HIWASSEE NORTH ALONG HIGHWAY TO GORDON HOLLOW (SINGLE SPUR LINE).

Gordon Hollow, SE. $\frac{1}{4}$ sec. 25, T. 21 N., R. 32 W., at crossroads; iron post stamped "1083 FTVL".....	1,084.704
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## BENTONVILLE SOUTH ALONG HIGHWAY TO OSAGE MILLS (SINGLE SPUR LINE).

Osage Mills, sec. 34, T. 19 N., R. 31 W., southwest corner of Rous's store; iron post stamped "1334 FTVL".....	1,335.852
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## BENTONVILLE NORTH ALONG HIGHWAY TO PINON HOLLOW (SINGLE SPUR LINE).

Pinon Hollow, NE. $\frac{1}{4}$ sec. 28, T. 21 N., R. 31 W., forks of road near mouth of; iron post stamped "995 FTVL".....	996.499
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## BENTONVILLE NORTHEAST ALONG HIGHWAY TO BRIGHTWATER.

T. 21 N., R. 30 W., northwest corner of sec. 26; iron post stamped "1315 FTVL".....	1,316.824
T. 21 N., R. 29 W., northwest corner of sec. 33; iron post stamped "1348 FTVL".....	1,349.843

## ROGERS EAST ALONG HIGHWAY TO WHITE RIVER (SINGLE SPUR LINE).

T. 19 N., R. 29 W., east side of sec. 1, on bank of White River; iron post stamped "1064 FTVL".....	1,065.427
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## ROGERS SOUTHWEST ALONG HIGHWAY 4.5 MILES (SINGLE SPUR LINE).

T. 19 N., R. 30 W., northwest corner of sec. 22; iron post stamped "1301 FTVL".....	1,302.137
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## SILOAM SPRINGS QUADRANGLE.

ROBINSON SCHOOLHOUSE SOUTHWEST ALONG HIGHWAY TO CINCINNATI, THENCE NORTH VIA SILOAM SPRINGS ALONG HIGHWAY AND RAILROAD TO GRAVETTE, THENCE EAST TO ROGERS (PORTION OF LINE).

Cincinnati, northwest end of town, sec. 29, T. 16 N., R. 33 W., west side of main road; iron post stamped "1039 FTVL".....	1,040.839
Siloam Springs, at railroad station, southwest corner of platform; iron post stamped "1148.6" (Indian Territory levels).....	1,154.512

## EUREKA SPRINGS QUADRANGLE.

## SELIGMAN, MO., SOUTH ALONG MISSOURI &amp; NORTH ARKANSAS RAILROAD TO EUREKA SPRINGS.

Missouri and Arkansas State line, 1.2 miles south of, 25 feet north of Berry switch on Missouri & North Arkansas Railroad, in side of rock, 1 foot above ground; bronze tablet stamped "998 FTVL".....	Feet. 999. 223
Beaver, sec. 20, T. 21 N., R. 26 W., 33 feet from east pier of bridge over White River, in south wall of the Narrows, 2.4 feet above ground; aluminum tablet stamped "929 FTVL".....	930. 648
Eureka Springs, on east side of Crescent Hotel, 9 feet from northeast corner of dining hall, 3.8 feet above ground; aluminum tablet stamped "1461 FTVL".....	1, 462. 491

## HABERTON EAST ALONG RAILWAY VIA HINDSVILLE TO HUNTSVILLE.

Goshen, sec. 32, T. 17 N., R. 28 W., 700 feet northeast of flour mill, in south face of ledge of natural rock on northwest side of Goshen-Hindsville public road; aluminum tablet stamped "1181 FTVL".....	1, 182. 843
Hindsville, center of N. $\frac{1}{2}$ sec. 16, T. 17 N., R. 27 W.; iron post stamped "1366 FTVL".....	1, 367. 407

## HINDSVILLE ALONG HIGHWAY NORTH TO CANUCK, THENCE WEST TO WAR EAGLE, THENCE SOUTH VIA SPRING VALLEY TO HINDSVILLE.

Clifty, NW. $\frac{1}{4}$ sec. 26, T. 18 N., R. 27 W., 1,300 feet north of Parker's ford over War Eagle Creek, in east face of natural ledge of granite on west side of Hindsville-Clifty road; bronze tablet stamped "1218 FTVL".....	1, 219. 571
Canuck, sec. 33, T. 19 N., R. 27 W., 10 feet east of building owned by Sam Cook, in south face of ledge of natural rock and southeast corner of post office; aluminum tablet stamped "1497 FTVL".....	1, 499. 115
War Eagle, near southeast corner of sec. 34, T. 19 N., R. 27 W., 180 feet north of post office, 40 feet east of old building, in west face of ledge of natural rock; bronze tablet stamped "1156 FTVL".....	1, 157. 240
Spring Valley, sec. 2, T. 17 N., R. 28 W., 70 feet west of post office, 5 feet north of spring owned by A. Sanders, in south face of ledge of natural limestone rock; copper bolt stamped "1301 FTVL".....	1, 302. 284

## GOSHEN SOUTHEAST ALONG HIGHWAY VIA WESLEY TO DRAKE'S CREEK (SINGLE SPUR LINE).

Wesley, sec. 26, T. 16 N., R. 28 W., school district 56, second brick from bottom in southeast corner of brick schoolhouse; bronze tablet stamped "1273 FTVL".....	1, 275. 147
Drake's Creek, sec. 32, T. 16 N., R. 27 W., 500 feet east of post office, in south face of natural ledge of rock on Aurora road, 300 feet east of junction with Huntsville road; aluminum tablet stamped "1284 FTVL".....	1, 286. 141

## HUNTSVILLE SOUTHEAST ALONG HIGHWAY TO WHARTON CREEK (SINGLE SPUR LINE).

T. 16 N., R. 26 W., center of N. $\frac{1}{2}$ sec. 23, in top of projecting rock, on west side of and 150 yards from War Eagle Creek, on main Huntsville and Aurora road; bronze tablet stamped "1321 FTVL".....	1, 322. 820
T. 16 N., R. 25 W., south side of sec. 20, about 200 yards south of Wharton Creek schoolhouse, near elm tree, in side of rock about 0.5 foot above ground; bronze tablet stamped "1352 FTVL".....	1, 353. 689

## HUNTSVILLE NORTH ALONG HIGHWAY TO EUREKA SPRINGS.

Huntsville, sec. 34, T. 17 N., R. 26 W., in east side of southeast corner of foundation of courthouse; bronze tablet stamped "1451 FTVL".....	1, 452. 740
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T. 17 N., R. 26 W., sec. 10, north bank of War Eagle Creek, at ford, on Huntsville and Eureka Springs road, in top of rock; bronze tablet stamped "1222 FTVL".....	Feet. 1, 223. 765
T. 18 N., R. 26 W., east side of sec. 22, near old storehouse, at junction of road from Clifty with Huntsville and Eureka Springs road; iron post stamped "1602 FTVL".....	1, 603. 699
T. 19 N., R. 26 W., southwest corner of sec. 33, on Huntsville and Eureka Springs road; iron post stamped "1568 FTVL".....	1, 569. 629

## EUREKA SPRINGS WEST ALONG HIGHWAY TO WHITE RIVER (SINGLE SPUR LINE).

White River, sec. 29, T. 20 N., R. 27 W., about 300 yards east of Knox Ferry and 11 feet west of large oak tree, in side of sandstone rock; bronze tablet stamped "1016 FTVL".....	1, 017. 932
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## EUREKA SPRINGS EAST ALONG HIGHWAY TO BERRYVILLE (MEAN OF TWO LINES).

Eureka Springs, 1.5 miles east of, on Berryville road, on ledge of rock in Mill Hollow; chiseled cross.....	1, 260. 98
T. 20 N., R. 25 W., sec. 20, 6.8 miles east of Eureka Springs, 6.8 miles west of Berryville, 100 feet west of west end of Kings River Bridge, 5 feet north of tollgate; iron post stamped "1066 FTVL".....	1, 067. 968
Berryville, 2.2 miles west of, in front of E. H. Smith's residence, on north side of road, on top of first stone step to spring.....	1, 217. 52
Berryville, in public square, 10 feet south of west stile of park, 66 feet west of pump, under music stand; iron post stamped "1256 FTVL"....	1, 256. 124

## BERRYVILLE SOUTH ALONG HIGHWAY TO CROSSROADS 2.5 MILES EAST OF MARBLE, THENCE WEST VIA MARBLE TO HUNTSVILLE.

T. 19 N., R. 24 W., east side of sec. 28, on Kingston road, southwest corner of Wright's store, 5 feet southwest of; iron post stamped "1286 FTVL"..	1, 288. 540
T. 18 N., R. 24 W., sec. 15, 14 feet northeast of Cedar Valley schoolhouse, on Kingston road, near mouth of Cedar Creek; iron post stamped "1365 FTVL".....	1, 367. 512
T. 17 N., R. 24 W., sec. 16, junction of Berryville-Kingston and Marble-Carrollton roads, 35 feet east of road, east of and near blacksmith shop; iron post stamped "1394 FTVL".....	1, 396. 083
Marble, sec. 13, T. 17 N., R. 25 W., in northwest corner of yard to City Hotel; iron post stamped "1345 FTVL".....	1, 347. 104

## POINT 2.5 MILES EAST OF MARBLE ALONG HIGHWAY SOUTH TO KINGSTON (SINGLE SPUR LINE).

Kingston, sec. 15, T. 16 N., R. 24 W., in southwest corner of public square; iron post stamped "1365 FTVL".....	1, 367. 026
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## BERRYVILLE SOUTH ALONG HIGHWAY TO PENSION MOUNTAIN (SINGLE SPUR LINE).

Pension Mountain, sec. 24, T. 19 N., R. 25 W., 5.8 miles southwest of Berryville, 200 yards from summit of mountain, on New Huntsville wagon road, in side of projecting rock; bronze tablet stamped "1565 FTVL".....	1, 566. 720
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## BERRYVILLE NORTH ALONG HIGHWAY TO SEC. 29, T. 21 N., R. 24 W., THENCE WEST TO SEC. 25, T. 21 N., R. 25 W.

T. 21 N., R. 24 W., S. $\frac{1}{2}$ sec. 29, junction of Eureka Springs and Viola roads; iron post stamped "1226 FTVL".....	1, 228. 286
Stony Point Church, 300 yards south of Summers Ford on Berryville-Cassville road, 11 feet south of southwest corner of church; iron post stamped "962 FTVL".....	964. 577

## HARRISON QUADRANGLE.

BERRYVILLE EAST ALONG HIGHWAY TO GREEN FOREST, THENCE ALONG RAILROAD TO ALPENA PASS, THENCE NORTH ALONG HIGHWAY TO DENVER.<sup>1</sup>

Green Forest, sec. 4, T. 19 N., R. 23 W., at southwest corner of Bank of	Feet.
Green Forest, in stone doorsill; aluminum tablet stamped "1349 FTVL".	1, 349. 239
Green Forest, 5 miles east of, in milepost 45; spike.....	1, 112. 24
Alpena Pass, sec. 23, T. 19 N., R. 22 W., 27 feet west of station platform,	
20 feet south of railroad track; iron post stamped "1139 FTVL".....	1, 139. 390
Denver, T. 20 N., R. 22 W., in Joe A. Young's yard, 6 feet east of east fence,	
10 feet south of north fence, in top of stone post 6 by 12 by 30 inches,	
set in ground; bronze tablet stamped "1028 FTVL".....	1, 028. 285

GREEN FOREST NORTH ALONG HIGHWAY TO OAK GROVE, THENCE TO RAUM, THENCE SOUTH TO DENVER.

Yocum, sec. 2, T. 20 N., R. 23 W., 300 yards east of creek crossing, on east	
side of mill, in stone foundation; bronze tablet stamped "1084 FTVL".	1, 084. 275
Oak Grove, sec. 28, T. 21 N., R. 23 W., in southeast corner of fence in yard	
of J. H. Evans, in top of stone post 6 by 22 by 36 inches; bronze tablet	
stamped "1347 FTVL".....	1, 347. 529
Raum, sec. 20, T. 21 N., R. 22 W., at base of chimney of A. Winkle's resi-	
dence, in coping; bronze tablet stamped "965 FTVL".....	965. 321

ALPENA PASS SOUTHEAST ALONG RAILROAD TO HARRISON (RUN TWICE).

Batavia, sec. 33, T. 19 N., R. 21 W., 200 feet north of spring, 33 feet east	
of northeast corner of station platform; iron post stamped "1489 FTVL".	1, 489. 055
Harrison, in northwest corner of square; iron post stamped "1052 FTVL".	1, 052. 480

HARRISON NORTHEAST ALONG HIGHWAY TO OREGON, THENCE NORTHWEST VIA SELF TO LOWRY, THENCE WEST-SOUTHWEST VIA OMAHA TO DENVER.

Oregon, sec. 17, T. 19 N., R. 19 W., 250 feet north of crossroads; iron post	
stamped "1324 FTVL".....	1, 324. 302
T. 20 N., R. 19 W., sec. 18, on "Rushing Farm," 600 feet south of house,	
16.3 miles northeast of Harrison, at fork of road, road west to Cheatmen,	
road east to Self; iron post stamped "1356 FTVL".....	1, 356. 026
Self, sec. 3, T. 20 N., R. 20 W., 50 feet east of blacksmith shop; iron post	
stamped "811 FTVL".....	811. 083
T. 21 N., R. 20 W., sec. 23, 1 mile north of Old Lowry, 100 feet southeast	
of Bluff Springs schoolhouse, district 36; iron post stamped "728 FTVL"	
(By short single spur line).....	727. 838
Omaha, sec. 27, T. 21 N., R. 21 W., 45 feet east of post office, 45 feet west	
of road; iron post stamped "1354 FTVL".....	1, 354. 314
Pruitt post office, sec. 20, T. 20 N., R. 21 W., in Mr. Moor's yard; 4 feet	
east of picket fence; iron post stamped "1483 FTVL".....	1, 482. 918

HARRISON NORTH ALONG HIGHWAY TO SELF.

T. 19 N., R. 20 W., sec. 9, 6.5 miles north of Harrison, fork of roads, run-	
ning west to Burlington and north to Self post office, 2,000 feet south of	
blacksmith shop; iron post stamped "1386 FTVL".....	1, 386. 421

GREEN FOREST SOUTH ALONG HIGHWAY VIA RULE AND OSAGE TO BOXLEY, THENCE NORTH-EAST TO CECIL'S FORK (BUFFALO CREEK), 12 MILES, THENCE VIA CARROLTON TO ALPENA PASS.

T. 19 N., R. 23 W., SW. $\frac{1}{4}$ sec. 29, 200 yards south of J. W. McCalib's house,	
50 feet east of blazed elm tree, in limestone outcrop; bronze tablet	
stamped "1245 FTVL".....	1, 244. 965

<sup>1</sup> Mean of three lines along highway and mean of two lines along railroad.

<b>Osage (Fairview), sec. 26, T. 18 N., R. 23 W., in stone front of W. S. Hittson's store; bronze tablet stamped "1331 FTVL"</b> .....	<b>Feet.</b> 1,331. 779
<b>T. 17 N., R. 23 W., sec. 27, 0.25 mile north of J. S. Alfred's place, 25 yards west of road forks, north side of road, in large sandstone boulder; bronze tablet stamped "1487 FTVL"</b> .....	1,486. 929
<b>T. 16 N., R. 23 W., on NE. <math>\frac{1}{4}</math> sec. 22, northeast corner of crossroads, 100 yards north of cabin of J. C. Patty, 5 feet south of black oak tree, in stone 2.5 by 1 by 4 feet; bronze tablet stamped "2230 FTVL"</b> .....	2,230. 385
<b>T. 16 N., R. 22, sec. 16, 100 yards west of Center Point schoolhouse, 10 yards south of road, in limestone outcrop; bronze tablet stamped "959 FTVL"</b> .....	959. 038
<b>T. 17 N., R. 21 W., sec. 33, 75 yards northeast of road crossing, 5 yards south of 2-foot white oak tree, near W. J. Young's house, in limestone boulder; aluminum tablet stamped "896 FTVL"</b> .....	895. 577
<b>T. 17 N., R. 22 W., NE. <math>\frac{1}{4}</math> sec. 13, 15 feet from township line, at road forks, on Harrison and Huntsville road, in front of H. S. Mallett's house, in stone; aluminum tablet stamped "2129 FTVL"</b> .....	2,128. 992
<b>T. 18 N., R. 22 W., SW. <math>\frac{1}{4}</math> sec. 25, 300 yards east of W. A. Hobgood's residence, 20 yards west of road forks at foot of white oak, in rock; aluminum tablet stamped "2153 FTVL"</b> .....	2,153. 025

## YOUNGS' CROSSROADS SOUTH ALONG HIGHWAY TO JASPER.

<b>Jasper, sec. 27, T. 16<sup>th</sup> N., R. 21 W., at left of north front entrance of courthouse, 2.5 feet above ground, in stone facing; aluminum tablet stamped "857 FTVL"</b> .....	857. 339
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## JASPER NORTH ALONG HIGHWAY VIA ELMWOOD TO HARRISON.

<b>T. 16 N., R. 21 W., SE. <math>\frac{1}{4}</math> NE. <math>\frac{1}{4}</math> sec. 24, 20 feet north of creek, in limestone ledge; aluminum tablet stamped "787 FTVL"</b> .....	787. 254
<b>T. 16 N., R. 20 W., sec. 8, 600 feet north of Buffalo, 600 feet west of Shadock's, at corner of fence 7 feet east of road, in sandstone 6 by 8 by 4 feet; aluminum tablet stamped "796 FTVL"</b> .....	795. 992
<b>T. 17 N., R. 20 W., NE. <math>\frac{1}{4}</math> sec. 33, 900 feet south of Mr. Erwin's house, at foot of Flat Rock Mountain, where road first strikes Flat Rock Creek, in sandstone; aluminum tablet stamped "968 FTVL"</b> .....	968. 248
<b>T. 17 N., R. 20 W., near northwest corner sec. 22, 3 feet from Boone-Newton county line, 100 feet north of L. L. Monday's house, in stone; aluminum tablet stamped "1348 FTVL"</b> .....	1,348. 637
<b>T. 17 N., R. 20, NW. <math>\frac{1}{4}</math> NW. <math>\frac{1}{4}</math> sec. 10, 125 feet east of forks in road, 100 feet east of A. H. Bryant's house, 4 feet south of red oak, in limestone post; aluminum tablet stamped "1218 FTVL"</b> .....	1,218. 351
<b>T. 18 N., R. 20, near southwest corner of sec. 21, 100 feet south of J. B. Wilson's house, 10 feet east of road, 50 feet west of Crooked Creek, in limestone; aluminum tablet stamped "1086 FTVL"</b> .....	1,086. 880

## WINSLOW QUADRANGLE.

## RUDY WEST ALONG HIGHWAY TO CEDARVILLE, THENCE NORTHWEST TO DUTCH MILLS, THENCE NORTHEAST TO STAUNTON.

<b>Natural Dam post office, sec. 15, T. 11 N., R. 32 W.; iron post stamped "672 F S"</b> .....	673. 528
<b>Dutch Mills, sec. 21, T. 14 N., R. 33 W., on main street, in front of White, Reed &amp; Co.'s store; iron post stamped "1027 F S"</b> .....	1,028. 935
<b>Clyde, sec. 17, T. 14 N., R. 32 W., in front of schoolhouse; iron post stamped "1325 F S"</b> .....	1,326. 408
<b>T. 15 N., R. 32 W., sec. 27, top of hill south side of wagon road between Prairie Grove and Boonsboro; iron post stamped "1414 F S"</b> .....	1,415. 660



Prairie Grove, sec. 18, T. 15 N., R. 31 W., brick store southwest corner Mack and Buchanan streets; aluminum tablet stamped "1168 F S".....	Feet. 1, 169.644
T. 15 N., R. 31 W., on line between secs. 15 and 16, Illinois Chapel; iron post stamped "1146 F S".....	1, 147.766

## DUTCH MILLS NORTH ALONG HIGHWAY TO SUMMERS (SPUR LINE).

T. 15 N., R. 33 W., southeast corner of sec. 16, 0.5 mile southeast of Summers; iron post stamped "1192 F S".....	1, 194.123
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## CEDARVILLE SOUTH ALONG HIGHWAY TO STATTLER (SPUR LINE).

Statler post office, sec. 22, T. 10 N., R. 32 W.; iron post stamped "903 F S".....	904.844
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## NATURAL DAM NORTHEAST ALONG HIGHWAY TO WESTFORK.

Lee's Creek post office, quarter corner on south side of sec. 25, T. 12 N., R. 32 W.; iron post stamped "755 F S".....	756.899
T. 13 N., R. 32 W., southeast corner of sec. 35; iron post stamped "1727 F S".....	1, 728.884
Strickler, sec. 7, T. 13 N., R. 31 W., northwest corner of John Neal's fence; iron post stamped "1568 F S".....	1, 569.848
T. 14 N., R. 31 W., sec. 23, near Longview schoolhouse; iron post stamped "1900 F S".....	1, 902.020

## LEE'S CREEK EAST ALONG HIGHWAY TO CHESTER.

T. 12 N., R. 31 W., quarter corner on east side of sec. 23; iron post stamped "1734 F S".....	1, 735.739
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## SEC. 32, T. 14 N., R. 30 W., SOUTHWEST ALONG HIGHWAY TO SEC. 2, T. 14 N., R. 31 W. (SPUR LINE).

T. 11 N., R. 31 W., near southeast corner of sec. 2; iron post stamped "1565 F S".....	1, 566.814
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## SEC. 4, T. 11 N., R. 29 W., NORTH ALONG HIGHWAY TO SEC. 28, T. 12 N., R. 29 W. (SPUR LINE).

T. 12 N., R. 29 W., southeast corner of sec. 28, near abandoned Sandpoint post office; iron post stamped "1606 F S".....	1, 608.376
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## WINSLOW NORTHEAST ALONG HIGHWAYS TO HAZEL VALLEY, THENCE NORTHWEST TO SEC. 21, T. 15 N., R. 29 W., THENCE WEST TO WESTFORK.

Winslow, southeast corner of Dunlap's drug store, on ledge of rock; aluminum tablet stamped "1742 F S".....	1, 743.858
T. 13 N., R. 29 W., sec. 1, Low Gap, crossroads in gap of Boston Mountains; iron post stamped "2042 F S".....	2, 043.968
T. 14 N., R. 29 W., sec. 10, 0.8 mile northwest of Arnett post office near main gate of cemetery; iron post stamped "1401 F S".....	1, 403.172

## SEC. 21, T. 15 N., R. 29 W., NORTH ALONG HIGHWAY TO SULPHUR CITY.

Sulphur City, sec. 22, T. 15 N., R. 29 W., foundation southwest corner of post office; aluminum tablet stamped "1364 F S".....	1, 366.306
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## SEC. 15, T. 10 N., R. 31 W., NORTHEAST ALONG HIGHWAY TO BELMONT.

Belmont, abandoned post office, quarter corner on east side of sec. 9., T. 10 N., R. 30 W.; iron post stamped "873 F S".....	874.768
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## MULBERRY NORTH ALONG HIGHWAY 11 MILES, THENCE SOUTHWEST TO MOUNTAINBURG.

T. 11 N., R. 29 W., east side of sec. 34, abandoned Plymouth post office; iron post stamped "794 F S".....	795.928
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**Arkadelphia, Benton, Caddo Gap, Camden, Gurdon, Hope, Hot Springs special, Little Rock, and Malvern quadrangles.**

**CALHOUN, CLARK, DALLAS, GARLAND, HEMPSTEAD, HOT SPRINGS, HOWARD, MONTGOMERY, NEVADA, OUACHITA, PIKE, POLK, PULASKI, AND SALINE COUNTIES.**

The elevations in the following list were determined by primary leveling extended from Little Rock. A double-rodged line of levels was run in 1896 from Little Rock along the St. Louis, Iron Mountain & Southern Railway to Hot Springs and continued in 1899 along the Chicago, Rock Island & Pacific Railway and the St. Louis, Iron Mountain & Southern Railway to Gurdon, connecting in 1900 with Camden by primary circuits. At Little Rock and Camden the work is adjusted to elevations for bench marks of the United States Army engineers' precise-level line. No intermediate connections were made.

The leveling from Little Rock to Hot Springs and in the Hot Springs special quadrangle was done in 1896 by H. L. Muldrow, and that along the railroads to Gurdon, Hope, and Buena Vista by Robert Coe in 1899-1900. The remaining work in the Gurdon quadrangle was done in 1899-1900 by D. C. Wray, and in the Camden quadrangle in 1900 by Guy E. Diehl. The leveling in the Caddo Gap quadrangle was partly done in 1901 by E. L. Shepard and J. A. Boyd, and was completed in 1902-03 by C. H. Birdseye. The leveling for the Hot Springs special and the Gurdon quadrangles has been copied with corrections from the Eighteenth and Twenty-first Annual Reports of the United States Geological Survey, respectively.

#### LITTLE ROCK QUADRANGLE.

##### AT LITTLE ROCK.

Little Rock, in granite substructure of east face of customhouse and post office, beneath water-table course of masonry; center of cross about 13½ inches north and about 5½ inches above the upper corner of the north line of the basement window nearest to Second Street (Coast and Geodetic Survey bench mark A) .....	Feet. 299.238
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#### BENTON QUADRANGLE.

##### AT BENTON.

Benton, in St. Louis, Iron Mountain & Southern Railway station yard; iron post stamped "297" .....	298.658
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#### HOT SPRINGS SPECIAL QUADRANGLE.

##### HOT SPRINGS ALONG CHICAGO, ROCK ISLAND & PACIFIC RAILWAY TO LAWRENCE.

Hot Springs, in stone window sill of Chicago, Rock Island & Pacific Railway passenger station; copper bolt stamped "598" .....	598.692
Spring Lake, sec. 12, T. 3 S., R. 19 W., in front of Chicago, Rock Island & Pacific Railway station; top of rail .....	335.7
Potash Sulphur Springs, sec. 17, T. 3 S., R. 18 W.; iron post stamped "388" (the above bench mark is on a single spur line) .....	388.634

## BENCH MARKS ESTABLISHED ALONG HIGHWAYS IN SOUTH PART OF QUADRANGLE.

T. 4 S., R. 18 W., 0.3 mile northeast of center of sec. 5; copper bolt stamped "409".....	Feet. 409.822
T. 4 S., R. 19 W., 0.3 mile south-southwest of center of sec. 8; iron post stamped "482".....	482.674
T. 4 S. R. 20 W., 0.2 mile northeast of center of sec. 3; iron post stamped "510".....	510.065
T. 3 S., R. 20 W., sec. 2, at Bull Bayou bridge; iron post stamped "392" ..	393.085
T. 2 S., R. 20 W., west of center of sec. 21, at Clear Creek; iron post stamped "480".....	480.979

## BENCH MARKS ON SINGLE SPUR LINES FROM MAIN CIRCUIT IN NORTH PART OF QUADRANGLE.

T. 1 S., R. 20 W., 0.3 mile northwest of center of sec. 32; copper bolt stamped "630".....	631.326
Mountain Valley, west side sec. 20, T. 1 S., R. 19 W.; iron post stamped "783".....	784.384
T. 1 S., R. 18 W., 0.2 mile southeast of center of sec. 32, north side of Saline River and road, between two nearby road forks; iron post stamped "523" ..	524.034
T. 2 S., R. 18 W., near northwest corner sec. 30, at Dipping Springs, south of road; iron post stamped "532".....	533.004

## MALVERN QUADRANGLE.

HOT SPRINGS SOUTHEAST ALONG CHICAGO, ROCK ISLAND & PACIFIC RAILWAY TO MALVERN, THENCE SOUTHWEST ALONG ST. LOUIS, IRON MOUNTAIN & SOUTHERN RAILWAY TO HOPE (DOUBLE-RODDED LINE) (PORTION OF LINE).

Malvern, near front entrance to Hot Springs County courthouse; iron post stamped "H. S. 310".....	311.123
Malvern, in monuments for meridian marks in courthouse yard; bronze tablets:	
North monument.....	311.386
South monument.....	307.151

## ARKADELPHIA QUADRANGLE.

HOT SPRINGS SOUTHEAST ALONG CHICAGO, ROCK ISLAND & PACIFIC RAILWAY TO MALVERN, THENCE SOUTHWEST ALONG ST. LOUIS, IRON MOUNTAIN & SOUTHERN RAILWAY TO HOPE (DOUBLE-RODDED LINE; PORTION OF LINE).

Arkadelphia, at northwest corner of Clark County courthouse, under corner-stone, in north face of second stone above ground; bronze tablet stamped "H. S. 246".....	246.801
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## GURDON QUADRANGLE.

HOT SPRINGS SOUTHEAST ALONG CHICAGO, ROCK ISLAND & PACIFIC RAILWAY TO MALVERN, THENCE SOUTHWEST ALONG ST. LOUIS, IRON MOUNTAIN & SOUTHERN RAILWAY TO HOPE (DOUBLE-RODDED LINE; PORTION OF LINE).

Curtis, 0.25 mile south of station, on east right of way line of St. Louis, Iron Mountain & Southern Railway and on line between secs. 1 and 36, 0.8 mile west of township line; iron post stamped "H. S. 170".....	171.112
Gurdon, northwest corner of Main and West Front Streets, in south face, near southeast corner, of brick building owned by A. W. Newton and used as a general store; aluminum tablet stamped "H. S. 209".....	210.127
Bierne, 880 feet northwest of railroad crossing north of, at quarter corner of secs. 1 and 12, on Dr. Kerston's property, 250 feet west of Methodist Church; iron post stamped "H. S. 237".....	238.457
Boughton, 130 feet north of railroad, inside fence at southwest corner of front yard of E. de Laughter's residence; iron post stamped "H. S. 234".....	234.646

Prescott, bronze tablets set in stone monuments in courthouse yard as meridian marks:	
North monument marked "H. S. 318".....	Feet. 319. 289
South monument.....	316. 700
Emmet, 130 feet west of center of station, 25 feet north of main line of St. Louis, Iron Mountain & Southern Railway, 5 feet west of milepost 449, 260 feet east of county line post between Nevada and Hempstead Counties; iron post stamped "H. S. 293".....	293. 927

## HOPE QUADRANGLE.

HOT SPRINGS SOUTHEAST ALONG CHICAGO, ROCK ISLAND & PACIFIC RAILWAY TO MALVERN, THENCE SOUTHWEST ALONG ST. LOUIS, IRON MOUNTAIN & SOUTHERN RAILWAY TO HOPE (DOUBLE-RODDED LINE) (PORTION OF LINE).

Hope, at southwest corner of Main and East Second streets, in north face of large foundation stone at northeast corner of Hempstead County Bank; aluminum tablet stamped "H. S. 356".....	357. 042
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## CAMDEN QUADRANGLE.

CAMDEN SOUTHWEST ALONG ST. LOUIS SOUTHWESTERN RAILWAY TO BUENA VISTA.

Camden, Ouachita County courthouse, in west face of second stone above ground and from northwest corner; iron post stamped "H. S. 199".....	199. 859
Buena Vista, in front of station, 75 feet south of main track of St. Louis Southwestern Railway, in front of residence of Mrs. Martha E. Sifford; iron post stamped "H. S. 287".....	288. 016

## GURDON QUADRANGLE.

GURDON SOUTHEAST ALONG ST. LOUIS, IRON MOUNTAIN & SOUTHERN RAILWAY TO CAMDEN.

Whelen, 450 feet west of station and 30 feet south of corner to secs. 26, 27, 34, and 35, T. 10 S., R. 20 W.; iron post stamped "H. S. 247".....	247. 499
Chidester, about 180 feet northeast of station, 50 feet east of track; iron post stamped "H. S. 230".....	231. 070

PRESCOTT SOUTH ALONG HIGHWAYS TO BODCAW, THENCE WEST TO BUENA VISTA.

Laneburg, 0.5 mile north of, in sec. 9, T. 12 S., R. 22 W., southeast corner of; iron post stamped "H. S. 284".....	284. 639
Bodcaw, 3 miles southeast of, 600 feet south of northeast corner sec. 16, north side of road; iron post stamped "H. S. 371".....	372. 002
T. 14 S., R. 21 W., southeast corner sec. 16, 2 miles east of Willisville, junction of Roeston and College Hill road with Camden and Texarkana road; iron post stamped "H. S. 361".....	362. 300
T. 14 S., R. 20 W., on line between secs. 14 and 23, 500 feet west of southeast corner of sec. 14, 1 mile southwest of Woodlawn, north side of road and east side of creek; iron post stamped "H. S. 254".....	255. 407
T. 14 S., R. 19 W., 0.6 mile east of quarter corner of sec. 10, west side of, on property of H. L. Lusby, 30 feet north of Camden and Texarkana road; iron post stamped "H. S. 263".....	263. 798

PRESCOTT WEST ALONG HIGHWAY 5 MILES (SINGLE SPUR LINE).

T. 11 S., R. 23 W., near southeast corner of sec. 9, on line between Nevada and Hempstead counties and 50 feet north of Washington road; iron post stamped "H. S. 327".....	327. 700
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## BENNETT'S CROSSROADS WEST ALONG HIGHWAY TO CENTERVILLE (SINGLE SPUR LINE).

T. 13 S., R. 22 W., 0.25 mile west of Bennett's, in southeast corner of sec. 16, 350 feet south of crossroads; iron post stamped "H. S. 372".....	Feet. 372. 925
Centerville, near quarter corner on east side of sec. 4, T. 13 S., R. 23 W., on line between Nevada and Hempstead counties, north side of Hope-Camden Road and 300 feet west of road north to church; iron post stamped "H. S. 338" .....	338. 795

## BODCAW WEST ALONG HIGHWAY 5.25 MILES (SINGLE SPUR LINE).

T. 13 S., R. 23 W., southeast corner of sec. 33, on line between Nevada and Hempstead counties, east side of road, opposite road to west, 5.25 miles west of Bodcaw; iron post stamped "H. S. 331" .....	332. 388
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## BENNETT'S CROSSROADS EAST ALONG HIGHWAY TO CANEY, THENCE NORTHEAST TO SAYRE.

T. 13 S., R. 21 W., at quarter corner on south side of sec. 21, southwest of crossroads to Roeston; iron post stamped "H. S. 378" .....	378. 939
Caney post office, 0.1 mile west of, quarter corner on east side of sec. 21, T. 13 S., R. 20 W., 80 feet north of road; iron post stamped "H. S. 324" ..	325. 039
T. 13 S., R. 19 W., sec. 7, 4 miles northeast of Caney, on north side of Camden Road and 300 feet east of White Oak Creek; iron post stamped "H. S. 218" (on single spur line).....	218. 914
Bluff City, 1.8 miles southwest of, quarter corner on south side of sec. 10, T. 12 S., R. 20 W., 75 feet west of road and 60 feet north of Spring Branch; iron post stamped "H. S. 283" .....	284. 513

## ZAMA WEST ALONG HIGHWAY TO MORRIS (SINGLE SPUR LINE).

T. 12 S., R. 21 W., in NW. $\frac{1}{4}$ sec. 26, 0.25 mile north of Morris, at southwest corner of cemetery at Caney Church and schoolhouse, northeast of crossroads; iron post stamped "H. S. 264" .....	265. 180
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## BLUFF CITY WEST-NORTHWEST ALONG HIGHWAY TO PRESCOTT.

T. 11 S., R. 20 W., on line between secs. 21 and 22, 0.25 mile south of corner, north side of Prescott and Bluff City road; iron post stamped "H. S. 173" ..	174. 518
T. 11 S., R. 21 W., near east corner of sec. 17, 6 miles east of Prescott, on south side of road and on west side of road to south; iron post stamped "H. S. 333" .....	334. 046

## PRESCOTT NORTH ALONG HIGHWAY TO OKOLONA.

T. 10 S., R. 22 W., northeast corner sec. 20, at southwest corner of crossroads; iron post stamped "H. S. 376" .....	377. 002
T. 10 S., R. 23 W., on line between secs. 15 and 16, and on line between Nevada and Hempstead counties, south side of Washington road; iron post stamped "H. S. 346" (on single spur line west from preceding bench mark).....	346. 527
Elkins Ford, on Little Missouri River, 1 mile north of, quarter corner on east side of sec. 21, T. 9 S., R. 22 W., 30 feet west of road; iron post stamped "H. S. 216" .....	217. 412

## SMITHTON WEST ALONG RAILROAD TO ANTOINE, THENCE SOUTH 3 MILES.

T. 9 S., R. 21 W., southeast corner sec. 15, 100 feet north of track and 30 feet west of road; iron post stamped "H. S. 319" .....	319. 541
Okolona, in southwest corner of high school yard, sec. 34, T. 8 S., R. 22 W.; iron post stamped "H. S. 423" .....	423. 672
Antoine, 3 miles south of, in sec. 33, T. 8 S., R. 23 W., at west side of military road; iron post stamped "H. S. 324" (on single spur line from Okolona). ..	325. 212

## SMITHTON EAST ALONG HIGHWAY 4 MILES (SINGLE SPUR LINE).

T. 9 S., R. 19 W., sec. 20, 4 miles east of Smithton, 60 feet south of old grade at log road and 60 feet west of end of lane to south, between two buildings on property of W. A. Young; iron post stamped "H. S. 176" ..	Feet. 177. 176
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## SINGLE SPUR LINE NORTH FROM BARHAM.

T. 11 S., R. 19 W., quarter corner on south side of sec. 26, 2 miles northeast of Barham post office, 150 feet east of road and 300 feet northeast of J. B. Benton's house; iron post stamped "H. S. 267" .....	267. 623
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## SINGLE SPUR LINE NORTHEAST FROM WHELEN SPRINGS.

T. 11 S., R. 19 W., on line between secs. 19 and 20, on north side of Gurdon-Camden road; iron post stamped "H. S. 198" .....	199. 200
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## ARKADELPHIA QUADRANGLE.

## ARKADELPHIA SOUTH ALONG MEMPHIS, DALLAS &amp; GULF RAILROAD TO DALARK (PORTION OF LINE).

Arkadelphia, 0.5 mile east of, on top of coping stone at north end of west abutment of steel bridge over Ouachita River .....	193. 41
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## MALVERN QUADRANGLE.

## ARKADELPHIA SOUTH ALONG MEMPHIS, DALLAS &amp; GULF RAILROAD TO DALARK (PORTION OF LINE).

Dalark, northwest corner of sec. 13, T. 8 S., R. 18 W., on line between Dallas and Clark Counties; iron post stamped "272 H. S." .....	272. 731
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## CAMDEN QUADRANGLE.

## DALARK EAST ALONG HIGHWAY TO PRINCETON, THENCE SOUTH TO BEARDEN, THENCE ALONG RAILROAD SOUTHWEST TO CAMDEN.

Nix, in E. $\frac{1}{2}$ SE. $\frac{1}{4}$ sec. 33, T. 8 S., R. 16 W., 230 feet east of post office; iron post stamped "227 H. S." .....	228. 160
T. 9 S., R. 16 W., 450 feet west of southeast corner of sec. 5, on section line, east side of Tulip and Tate's road, at southeast corner of W. H. Dickenson's field; iron post stamped "296 H. S." .....	297. 255
Princeton, on west side of entrance of Dallas County jail, between two bricks in eleventh row from bottom of steps; aluminum tablet stamped "287 H. S." .....	287. 769
T. 9 S., R. 15 W., on line between secs. 14 and 15, at intersection of Princeton, Bearden, and Holly Springs roads; iron post stamped "300 H. S." ..	301. 030
The following bench marks are on single spur lines from main circuit:	
T. 9 S., R. 14 W., at intersection of dirt roads, 120 feet south of Zion Church; iron post stamped "351 H. S." .....	352. 341
T. 10 S., R. 14 W., at intersection of Fordyce and Princeton dirt road and Harlow Lumber Co.'s tram road, 420 feet east of old water tank; iron post stamped "222 H. S." .....	222. 644
T. 10 S., R. 15 W., at northwest corner sec. 25, in mill creek bottom of William Marshall, sr.; iron post stamped "213 H. S." .....	213. 482
T. 11 S., R. 15 W., at northwest corner sec. 35; iron post stamped "229 H. S." .....	230. 149
Harlow, 450 feet southwest of station, 10 feet southwest of milepost 318, T. 11 S., R. 14 W.; iron post stamped "270 H. S." .....	271. 369
T. 12 S., R. 14 W., northwest corner sec. 9, 380 feet north of Chambersville-Camden dirt road; iron post stamped "285 H. S." .....	285. 493

T. 12 S., R. 15 W., 19.7 feet east of northwest corner of sec. 23, on section line; iron post stamped "214 H. S.".....	Feet. 215. 299
Onalaska, 600 feet southwest of station, 8 feet southwest of milepost 329, T. 12 S., R. 16 W.; iron post stamped "129 H. S.".....	130. 117
Van Duzer, 2.5 miles southwest of; railroad spike in milepost 334.....	110. 64

CAMDEN NORTH ALONG PUBLIC ROAD TO DALARK.<sup>1</sup>

T. 12 S., R. 17 W., in southwest part of sec. 13, one-eighth mile north of section line, 12 feet southeast of old store building of James Dunn; iron post stamped "118 H. S.".....	119. 045
T. 11 S., R. 16 W., at northwest corner sec. 28, 1 mile east of corner of pasture, beside wire fence; iron post stamped "143 H. S.".....	144. 255
T. 11 S., R. 17 W., 35 feet west of quarter corner between secs. 22 and 23, 40 feet west of Mrs. Jestice's barn lot; iron post stamped "143 H. S." ..	143. 599
T. 10 S., R. 17 W., 800 feet southwest of northeast corner of sec. 22, at southeast corner of Ouachita Church property; iron post stamped "156 H. S.".....	156. 865
T. 10 S., R. 16 W., quarter corner on east side of sec. 16, 250 feet southeast of bridge over Whiteoak Creek, on south side of road; iron post stamped "155 H. S.".....	156. 272
T. 9 S., R. 17 W., on line between secs. 16 and 21, about 200 feet south of corner known as "Gray Rock," at fork of road; iron post stamped "191 H. S.".....	191. 568

## SPARKMAN'S MILLS WEST ALONG HIGHWAY 8 MILES (SINGLE SPUR LINE).

T. 9 S., R. 18 W., at sixteenth corner between secs. 33 and 34, 10 feet north of P. Bennett's new well; iron post stamped "204 H. S.".....	205. 257
T. 10 S., R. 18 W., 500 feet east of center of sec. 10, on west side of Ouachita River; iron post stamped "207 H. S.".....	208. 005

## CAMDEN EAST ALONG HAMPTON PUBLIC ROAD TO SREAD (SINGLE SPUR LINE).

T. 13 S., R. 16 W., in center of sec. 33, at corner of field where road forks; iron post stamped "107 H. S.".....	107. 564
T. 13 S., R. 15 W., at north quarter corner of sec. 26; iron post stamped "157 H. S.".....	158. 224
T. 13 S., R. 14 W., at northwest corner sec. 9; iron post stamped "215 H. S.".....	216. 002

## CAMDEN WEST ALONG HIGHWAY 5.6 MILES (SINGLE SPUR LINE).

T. 13 S., R. 18 W., sec. 25, at fork of Camden-Texarkana dirt road; iron post stamped "137 H. S.".....	137. 515
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## CHIDESTER NORTHEAST ALONG HIGHWAY (SINGLE SPUR LINE).

T. 11 S., R. 18 W., Mrs. Allen's house, 800 feet south of, 800 feet south of intersection of Chidester-Wyloe dirt road with Arkansas Mill Co.'s tram road; iron post stamped "223 H. S.".....	224. 090
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## LESTER AND FINN ON SHORT SINGLE SPUR LINES FROM MAIN LINE ALONG RAILROAD.

Lester, sec. 36, T. 12 S., R. 18 W., 10 feet east of Lester Lumber Co.'s office and post office, 55 feet west of track of Gurdon branch, St. Louis, Iron Mountain & Southern Railway; iron post stamped "120 H. S.".....	120. 440
Finn, T. 14 S., R. 17 W., 45 feet west of track, 140 feet north of railroad crossing; iron post stamped "143 H. S.".....	144. 286

<sup>1</sup> The first five of the bench marks are on single spur lines.

## ARKADELPHIA QUADRANGLE.

HOT SPRINGS WEST ALONG DALLAS ROAD TO BLACK SPRINGS (DOUBLE-RODDED LINE,  
PORTION OF LINE).

	Feet.
Bull Bayou, at forks of road near bridge; iron post stamped "392".....	392. 218
Myers, in blue granite rock front of J. A. Helm's mill and Wheatley Bros.'s store, T. 3 S., R. 22 W.; aluminum tablet stamped "H. S. 566".....	565. 889
Alamo, 700 feet east of old post office, sec. 22, T. 3 S., R. 23 W., in large bowlder north side of road, near middle of Narrows on Mazarn Creek; aluminum tablet stamped "H. S. 677" .....	677. 279

## CADDO GAP QUADRANGLE.

HOT SPRINGS WEST ALONG DALLAS ROAD TO BLACK SPRINGS (DOUBLE-RODDED LINE;  
PORTION OF LINE).

Plata, at southeast corner of post office, set in sandstone, T. 3 S., R. 24 W.; bronze tablet stamped "H. S. 793".....	792. 626
Black Springs, at northeast corner of post office, in sandstone, T. 3 S., R. 25 W.; bronze tablet stamped "H. S. 777" .....	777. 019

## BLACK SPRINGS ALONG DALLAS ROAD TO BIG FORKS (SINGLE-SPUR LINE AFTER 5 MILES).

Black Springs, 7.1 miles west of, 0.25 mile west of J. A. Irby's house, south side of road, in sandstone and flint bowlder; bronze tablet stamped "H. S. 907".....	907. 278
Black Springs, 12 miles west of, 150 feet northwest of sign reading "Black Springs," between houses of Crawford and G. R. Cox, in ledge of black granite shale; bronze tablet stamped "H. S. 1086".....	1,085. 499
Big Fork, midway between post office and Shed schoolhouse, south side of road, in black granite bowlder; bronze tablet stamped "H. S. 1098".....	1,098. 537

## POINT 6.5 MILES EAST OF BLACK SPRINGS SOUTH ALONG HIGHWAY VIA CADDO GAP TO ROCK CREEK, THENCE WEST TO LANGLEY, THENCE NORTH VIA FANCY HILL TO POINT 5 MILES WEST OF BLACK SPRINGS.

Caddo Gap, 1.5 miles north of, opposite Exall's store, in front yard of S. H. Hanna; iron post stamped "H. S. 640".....	639. 618
Rock Creek, 1,000 feet west of post office, edge of Rock Creek, in huge brown sandstone bowlder; bronze tablet stamped "H. S. 536".....	535. 650
Wilson, front yard of post office, in blue-gray siliceous sandstone; aluminum tablet stamped "H. S. 804".....	804. 10
Lodi, 0.5 mile west of, in corner of field 750 feet northwest of temporary bench mark, on main road where sign reads "Free Will Church, 1½ miles," on section line, 0.25 mile south of section corner; iron post stamped "H. S. 870" .....	869. 652
Langley, 0.5 mile east of, at southwest corner of crossroads running through Fancy Hill and Star of the West; iron post stamped "H. S. 787".....	787. 333
Fancy Hill, 300 feet south of post office, at foot of lane; iron post stamped "H. S. 822".....	821. 525

## CADDO GAP WEST ALONG HIGHWAY 5 MILES (SINGLE-SPUR LINE).

Caddo Gap, 5 miles west of, 150 feet south of Park schoolhouse, district 30, in brown sandstone bowlder; bronze tablet stamped "H. S. 703".....	702. 872
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## WILSON SOUTH ALONG HIGHWAY TO KIRBY.

Kirby, opposite post office, center of town, northeast corner of cross streets, in brown sandstone rock; aluminum tablet stamped "H. S. 666".....	665. 925
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GURDON NORTHWEST ALONG ST. LOUIS, IRON MOUNTAIN & SOUTHERN RAILWAY VIA OKOLONA TO KIRBY.

Pike City, northwest corner of platform of Frank Pennington's store; iron post stamped "H. S. 660".....	Feet. 659. 047
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BOBOS SWITCH ALONG HIGHWAY WEST VIA MURFREESBORO, THENCE NORTH ALONG NARROW GAGE ROAD TO POINT 5 MILES NORTHWEST OF PIKE.

Wolf Creek post office; iron post set at fence corner 20 feet north of post-office building, stamped "516 H. S".....	515. 271
Murfreesboro, in east wall of courthouse; aluminum tablet stamped "H. S. 367".....	366. 606
Lissie, 2 miles southeast of, crossroads by log house, 0.25 mile south of log railway, northwest corner; iron post stamped "H. S. 542".....	541. 202

MURFREESBORO WEST ALONG HIGHWAY TO CENTER POINT.

T. 8 S., R. 26 W., on quarter section line 0.25 mile south of north boundary of sec. 21, 90 feet north of fence on north side of old military road; iron post stamped "H. S. 655".....	654. 429
T. 8 S., R. 27 W., southeast corner of SW. $\frac{1}{4}$ sec. 22, 62 feet east, in southwest corner of graveyard, just inside of fence; iron post stamped "671 H. S.".....	670. 965
Center Point, southwest corner of sec. 25, T. 8 S., R. 28 W., 24 feet south of, along picket fence, 35 feet north of cotton gin; iron post stamped "H. S. 591".....	590. 469

CENTER POINT NORTHEAST ALONG HIGHWAY TO MUDDY FORK, THENCE WEST ALONG PRIVATE ROAD TO BAKER SPRINGS, THENCE SOUTH TO CENTER POINT.

Muddy Fork post office, 300 feet south of cotton gin, directly in front of new store, at corner of rail fence; iron post stamped "H. S. 564".....	563. 171
On Baker Springs road, 9 miles north of Center Point, at southwest corner of picket fence in front of E. H. Zollett's house; iron post stamped "H. S. 670".....	669. 372

MUDDY FORK EAST ALONG HIGHWAY TO NATHAN (DIRECT AND REVERSE SPUR LINE).

Nathan, 1.5 miles northwest of, 300 feet south of John Cornish's house, 10 feet north of rail fence; iron post stamped "H. S. 503".....	502. 698
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BAKER CITY NORTH ALONG HIGHWAY 4 MILES, THENCE EAST VIA NEW HOPE TO KIRBY.

New Hope, 5 miles southwest of, at junction of Hot Springs and Lockesburg road with Center Point and Dallas road, 20 feet east of crossing; iron post stamped "H. S. 771".....	770. 17
Daisy, 30 feet southeast of Dr. Phillip's store; bronze tablet set in large boulder, stamped "629 H. S.".....	628. 776

NEW HOPE NORTHWEST ALONG HIGHWAY TO ATHENS, THENCE EAST TO LANGLEY.

Athens, quarter corner, middle of sec. 15, T. 5 S., R. 28 W., 300 feet east of schoolhouse; iron post stamped "H. S. 959".....	958. 429
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De Queen and Lockesburg quadrangles.

HOWARD, POLK, AND SEVIER COUNTIES.

These elevations are based upon the 1907 adjustment of precise leveling and are connected with the precise level line of the United States Army engineers from Little Rock to Camden through intervening work in the Caddo Gap and adjacent quadrangles. Checks obtained upon the Oklahoma levels were unsatisfactory, and one line could not be adjusted.

The leveling was done in 1908 by W. A. Gelbach.

## DE QUEEN QUADRANGLE.

CENTER POINT WEST TO PROVO, THENCE SOUTH ALONG DE QUEEN & EASTERN RAILROAD TO  
POINT ABOUT 3 MILES NORTH OF LOCKESBURG.

Center point, 2.5 miles west of, at corner of yard of negro house; iron post stamped "Prim. Trav. Sta. No. 4 1907 583 1908".....	Feet. 582. 180
Messer Creek, at top of hill east of, 240 feet south of house of Robert Hill, at turn of road, 40 feet south of large oak tree, in stone 8 by 10 by 28 inches, 26 inches in ground; aluminum tablet stamped "455 1908".....	454. 922
De Queen & Eastern Railroad bridge over Saline River, 0.25 mile south of, 150 yards east of Saline River ford, in front of T road north, in root of tree; notch.....	345. 71
De Queen & Eastern Railroad bridge over Saline River, on southeast pier; painted square.....	353. 15
Provo, 1 mile north of, 600 feet south of milepost 20, 40 feet east of railroad crossing, in stone 6 by 6 by 26 inches, 24 inches in ground; aluminum tablet stamped "351 1908".....	350. 883
Provo, in front of station; top of rail.....	390. 2
Provo, 0.7 mile south of, at southeast corner of railroad crossing, top of post is deeply dented by hammering, on north edge of post on letters "B. M."; iron post stamped "Prim. Trav. Sta. No. 3 1907 375 1908".....	374. 757
Milepost 16, 0.1 mile north of, at dim road crossing, 40 feet east of track, 50 feet south of crossing, in stone 6 by 10 by 28 inches, 26 inches in ground; aluminum tablet stamped "426 1908".....	425. 573

PROVO NORTH TO ROCK SPRINGS, THENCE NORTH TO MINEOLA, THENCE EAST TO ATHENS.

Dierks, 3 miles southwest of, east side of railroad at crossing, 100 feet north of milepost 24, 12 feet north of fence corner; iron post stamped "384 1908".....	384. 661
Dierks, in front of station; top of rail.....	420. 99
Dierks, 1.8 miles north of, along old tramway now used as wagon road, at northwest corner of road crossing; iron post stamped "Prim. Trav. Sta. No. 5 1907 560 1908".....	560. 498
Euclid post office, 4 miles northwest of Dierks, at north side of Hester's store; iron post stamped "595 1908".....	594. 902
Burg post office, 3.3 miles south of Rock Springs, on Center Point road, 0.9 mile southeast of ford of Saline River, at southeast corner of T road south, in corner of field of Mrs. Wimms; iron post stamped "755 1908".....	755. 283
Rock Springs (Burg post office), 150 feet east of cotton gin, on east side of road, on slope of hill; iron post stamped "748 1908".....	748. 012
Umpire, 100 feet east of post office, 50 feet west of blacksmith shop, 40 feet northwest of small bridge, in stone 5 by 12 by 22 inches, 20 inches in ground; aluminum tablet stamped "839 1908".....	839. 161
Mineola, south side of road, 50 feet east of spring, north of sawmill, in top of large granite boulder; aluminum tablet stamped "973 1908".....	973. 119
Saline River ford, 1 mile west of Athens; surface of water, June, 1908.....	847

GENEVA ALONG DE QUEEN & EASTERN RAILROAD TO DE QUEEN, THENCE NORTH ALONG KANSAS  
CITY SOUTHERN RAILWAY TO GILLHAM, THENCE EAST TO ROCK SPRINGS.

Geneva, at southeast corner of church; iron post stamped "Prim. Trav. Sta. No. 2 1907 360 1908".....	359. 969
De Queen, 2 miles east of, 150 feet east of railroad crossing, 50 feet south of track, 1 foot west of wire fence, in stone 6 by 8 by 30 inches, 28 inches in ground; aluminum tablet stamped "377 1908".....	376. 821
De Queen, in front of De Queen & Eastern Railroad station; top of rail...	370. 1
De Queen, in front of Kansas City Southern Railway station; top of rail..	379. 8

De Queen, at southwest corner of courtyard, 3 feet west of fence and 7 feet north of corner fence post; concrete stone set level with ground and marked <table style="display: inline-table; vertical-align: middle;"><tr><td>U S C</td></tr><tr><td>1905</td></tr><tr><td>&amp; G S</td></tr></table> on center of stone.....	U S C	1905	& G S	Feet. 419.320
U S C				
1905				
& G S				
De Queen courthouse, in top of concrete railing to steps at east side of north doorway; aluminum tablet stamped "429 1908".....	428.621			
Pullman, 50 feet west of signboard at station; iron post stamped "544 1908".....	543.785			
King's spur, 30 feet north of Stewart's store; iron post stamped "633 1908".....	632.653			
Gillham, 150 feet east of railway station, 10 feet north of public well; iron post stamped "751 1908".....	751.414			
Coeatot River ford, 0.8 mile west of, where Gillham-Antimony road reaches summit of ridge west of river, 20 feet north of road, 10 feet north of black oak 24 inches in diameter, blazed, with letters "U. S." cut in; in top of bowlder; aluminum tablet stamped "597 1908".....	597.673			
Antimony, 0.25 mile southeast of, 6 feet south of road, 50 feet east of road fork, in top of rock; aluminum tablet stamped "754 1908".....	754.309			
Antimony, 3.8 miles northeast of where country road from Rock Springs joins "wire" road, at northwest corner of crossroads; iron post stamped "783 1908".....	783.558			
GILLHAM NORTH VIA GRANNIS TO WICKS, THENCE EAST TO MINEOLA.				
Moore's spur, 1.5 miles north of, 100 feet north of crossing, 50 feet west of track, 150 feet northeast of house of J. L. Beidelman; iron post stamped "768 1908".....	768.143			
Grannis, in front of station; top of rail.....	920			
Grannis, 50 feet east by 50 feet south of railway station, at northwest corner of porch of Elberta Hotel, 1 foot inside of fence; iron post stamped "921 1908".....	921.566			
Wicks, 100 feet west of station, at board fence; iron post stamped "1028 1908".....	1,027.961			
Wicks, in front of station, top of rail.....	1,025.9			
Wicks, 2.8 miles east of, on Baker Springs road, south side of road at dim road fork at corner of field; iron post stamped "984 1908".....	982.618			
Wicks, 7.1 miles east of, at fork of roads to Baker Springs and to Center Point, about 600 feet west of schoolhouse, north side of road at small bridge; iron post stamped "871 1908".....	871.582			
Baker Springs, 1.25 miles southeast of, on Center Point road, east side of road at fork of trail to west; iron post stamped "679 1908".....	678.673			
Mineola, 4.25 miles west of, on Baker Springs road, 600 feet north of fork of road just east of Harris Creek ford, on east side of and 3 feet above road in top of rock ledge; aluminum tablet stamped "669 1908".....	669.648			
Mineola, 0.4 mile west of, at forks of road; on root of tree.....	942.30			
DE QUEEN WEST VIA ULTIMA THULE TO STATE LINE.				
Chapel Hill, 0.5 mile southeast of, in fork of road, in top of sandstone; aluminum tablet stamped "Prim. Trav. Sta. No. 1. 1907 433 1908".....	433.649			
Ultima Thule, 15 feet west of southwest corner of Scott's cotton gin, Arkansas-Oklahoma boundary post 92; stamped "353".....	353.339			
Tps. 5 and 6 S., Rs. 26 and 27 E., 3.5 miles west of Ultima Thule; iron post stamped "487".....	487.457			
BOUNDARY POST ON STATE LINE ABOUT 1 MILE SOUTHWEST OF BLANCHARD EAST TO GILLHAM.				
Blanchard, 1 mile southwest of, 200 feet west of house at Newcomb place, south side of road, Arkansas-Oklahoma boundary post 85, top of post....	734.867			

Blanchard, 1 mile southeast of, 15 feet south of road on top of hill, 400 feet east of farmhouse; iron post stamped "769 1908".....	Feet. 767.373
Gillham, 4.5 miles west of, on Blanchard road, 40 feet south of road in front of old cabin; iron post stamped "562 1908".....	559.874

## GRANNIS WEST TO POST 79 ON THE ARKANSAS-OKLAHOMA BOUNDARY.

Grannis, 4.8 miles west of, on Hochetown road, 1 mile east of Cross Creek, north side of road, 150 feet east of road fork; iron post stamped "952 1908".....	951.781
Arkansas-Oklahoma boundary line post 79, about 700 feet south of, about 150 feet south of small stream, closing corner of T. 3 S., R. 27 E. (on border line) of Oklahoma land survey; iron post stamped "831 1908"....	830.586
Tps. 3 and 4 S., Rs. 26 and 27 E., in Oklahoma; iron post.....	1,086.419

## WICKS TO JANSSEN VIA HATTON.

Hatton, 0.7 mile south of, 250 feet south of railway water tank, at southeast corner of crossing 30 feet east of track; iron post stamped "1135 1908"..	1,135.665
Janssen, in front of station; top of rail.....	1,074
Janssen, 40 feet south of station, 50 feet east of tracks; iron post stamped "1077 1908".....	1,076.938

## JANSSEN VIA HATFIELD ALONG RAILROAD, THENCE EAST AND SOUTHEAST ALONG HIGHWAYS TO BENCH MARK POST 0.25 MILE WEST OF LITTLE BRUSHY CREEK, THENCE SOUTHWEST TO JANSSEN.

Cove, 30 feet north of station, 70 feet east of tracks; iron post stamped "1046 1908".....	1,047.075
Hatfield, in front of station, top of rail.....	969.6
Hatfield, 1 mile east of, in front of T road west; iron post stamped "1043 1908".....	1,043.371
Hatfield, 4.4 miles east of, on Camp Wilder road, 300 feet north of sawmill, 40 feet northeast of road, in sag of ground; iron post stamped "1185 1908" ..	1,185.702
T. 3 S., R. 31 W., 0.25 mile south of corner of secs. 25, 26, 35, and 36, at northeast corner of T road north at south end of lane; iron post stamped "1179 1908".....	1,179.510
Little Brushy creek, 0.25 mile west of house of Jack Hicks, at fork of road where road leaves stream above fork of Big and Little Brushy creeks on south side of road at south end of field; iron post stamped "952 1908"....	953.004
Janssen, 3.1 miles northeast of, 20 feet east of small stream, 5 feet north of road, 5 feet south of 8-inch white oak with notch and blaze, lettered "U. S. P. B. M." in top of rock; aluminum tablet stamped "1067 1908"..	1,067.514

LITTLE BRUSHY EAST TO SHADY POST OFFICE, THENCE EAST AND SOUTH TO MINEOLA.<sup>1</sup>

Big Brushy Creek, 3 miles northeast of fork of Big and Little Brushy, old Sutton place, 30 feet south of house near old fence; iron post stamped "1071 1908".....	1,071.425
Ebersen City (Shady post office), 2.6 miles north of, in fork of road, 70 feet west of crossing of small stream, west side of mountain where Mena-Lockesburg road crosses from Cossatot to Board Camp Valley; iron post stamped "1228 1908".....	1,227.954
Ebersen City (Shady post office), 100 feet south of store of Capt. Hazlett, west side of road; iron post stamped "1068 1908".....	1,068.258
Ebersen City (Shady post office), 3.3 miles east of, on Sugar Creek road, at northeast corner of yard of William Walston; iron post stamped "1193 1908".....	1,194.135

<sup>1</sup> An excessive error has been distributed in this line.

Eberson City (Shady post office), 6.8 miles east of, on Sugar Creek road, north side of road, 100 feet south of house of Mr. Aleshire; iron post stamped "1374 1908".....	Feet. 1,374.718
Blaylock Mountain, at top of, where old mail trail crosses, 20 feet north of black oak tree with letters "U. S. G. S." cut in west face, 10 feet east of trail, in top of stone; aluminum tablet stamped "1643 1908".....	1,644.451
Mineola, 4 miles north of, at southwest corner of yard of J. H. Hardy; iron post stamped "Prim. Trav. Sta. No. 8 1907 1141 1908".....	1,142.641

HATFIELD WEST TO NORTHWEST CORNER OF T. 1 S., R. 27 E. IRON POST ON STATE LINE.<sup>1</sup>

Hatfield, 0.7 mile west of, in fork of road at west end of lane; iron post stamped "Prim. Trav. Sta. No. 12 1907 966 1908".....	965.379
Mountain Fork bridge, on top of east concrete pillar on south side of approach to east end of bridge; painted square.....	832.30
T. 1 S., R. 27 E., at northwest corner of township, on State line; iron post stamped "940".....	933.509

LOCKESBURG QUADRANGLE.

POINT ABOUT 3 MILES NORTH OF LOCKESBURG SOUTH ALONG RAILROAD TO LOCKESBURG, THENCE NORTHWEST ALONG RAILROAD TO GENEVA.

Lockesburg, in west face of brick pillar on west side of door of bank building; aluminum tablet stamped "437 1908".....	437.555
Lockesburg, in front of station; top of rail.....	406.6

Atlanta and Texarkana quadrangles.

MILLER COUNTY.

The initial bench marks are on the Coast and Geodetic Survey precise-level line along Missouri, Kansas & Texas Railway at Jefferson and Pittsburg, Tex.

The leveling was done by Chester Irvine in 1905.

ATLANTA QUADRANGLE.

STATE LINE NEAR RAVENNA, SOUTH 3.5 MILES ALONG KANSAS CITY SOUTHERN RAILWAY.

Ravenna station, 60 feet west of signboard, west of track, at telegraph pole; iron post stamped "250 ADJ 1903".....	Feet. 249.574
Ravenna, 3.5 miles south of, 30 feet north of Arkansas-Louisiana State line, 50 feet northwest of road crossing, in fence corner; iron post stamped "227 ADJ 1903".....	227.421

TEXARKANA QUADRANGLE.

AT TEXARKANA.

Texarkana post office, in stone railing south front west of steps, 5 feet above sidewalk; bronze tablet stamped "332 ADJ 1903".....	331.896
Texarkana, Miller County courthouse, at northeast corner of yard, United States Geological Survey meridian mark; bronze tablet stamped "337 ADJ 1903 1905 TEXARKANA".....	337.447

<sup>1</sup> This line unadjusted, elevations carried from Hatfield to Indian Territory bench mark, closing minus 8.724.

## LOUISIANA.

## PRECISE LEVELING.

Crowley, Derouen, Jeanerette, Lafayette, Lake Arthur, and St. Martinville quadrangles.

ACADIA, CALCASIEU, IBERIA, LAFAYETTE, AND ST. MARY PARISHES.

The following are the unadjusted results of a spur line of precise levels from Weeks Island east along the Cypremort branch of the Southern Pacific Railroad to Baldwin, thence along the main line of the Southern Pacific Railroad northwest to Lafayette, thence west to Jennings, a total distance of about 100 miles. The work was done in cooperation with the Louisiana Geological Survey, Prof. G. D. Harris, State geologist, in charge. Prof. Harris established an automatic tide gage and several bench marks, descriptions of which are included, on Weeks Island in February, 1905. The line starts from bench mark No. 1 (upper), one of those established by Prof. Harris. This bench mark is the rounded top of a brass plug protruding through the cap on an iron post set about 250 yards west of the terminus of the railroad at the Weeks Island salt mine, and about 0.8 mile east from the tide gage. The elevation as determined by the Coast and Geodetic Survey in 1905 and 1906 is 19.42 feet above mean sea level.

The leveling was done in 1906 by E. L. McNair.

## DEROUEEN QUADRANGLE.

WEEKS ISLAND.<sup>1</sup>

Weeks Island, in marsh on west side of island, in Weeks Bay, which is the northeast portion of Vermilion Bay. Zero of a fixed tide staff secured to a pile near the tide house <sup>2</sup> of automatic tide gage 45, which is built on piles driven in the marsh (below sea level).....	Feet. —3.92
Bench mark No. 1 (lower), about 250 yards west of terminus of railroad at salt mine, and 0.7 mile east of tide gage, 4 feet below surface of ground; top of 1-inch rounded head of 3-inch brass bolt 0.5 inch in diameter, set vertically in cement, surmounted by a 4-inch iron pipe 5 feet long covered with an iron cap bolted on in such a way as to permit level rod to be inserted.....	14.130
Bench mark No. 1 (upper), rounded top of brass plug protruding through iron cap over bench mark No. 1 (lower), about 1 foot above ground .....	19.426
Bench mark No. 2 (lower), in northern part of Weeks Island, about 20 yards from private road and 5 yards from stream bed; similar to bench mark No. 1.....	32.177
Bench mark No. 2 (upper), rounded top of brass plug protruding through the iron cap over bench mark No. 2, about 1 foot above ground.....	37.437

<sup>1</sup> Bench marks numbered 1 to 6 were established by Prof. G. D. Harris, state geologist (Louisiana Geological Survey).

<sup>2</sup> This tide station was established by Prof. G. D. Harris at the expense of the Louisiana Geological Survey, but the gage was set and records made by and at the expense of the Coast and Geodetic Survey. The elevation given was determined from the automatic record for the years 1905 and 1906. The tide at Weeks, La., is diurnal, or has one high water and one low water in each day, about half the time.

Bench mark No. 3, southeastern part of Weeks Island, in brick wall of Foote sugarcane house, about 4 feet above ground and 8 feet to right of central door; center of a half-inch drill hole 4 inches deep.....	Feet. 44.50
Bench mark No. 4, inside Myles Salt Co. inclosure, about 30 feet east of gate to main road, in sleeve coupling screwed to top of 2.5-inch iron pipe 4 feet long, which has an 8-inch flange screwed to bottom; top of 1.5-inch square bolt.....	127.898
Bench mark No. 5, southwest side of deep cut in road from Foote sugarcane house to Sandy Bottom Lake, about 15 feet west of edge of cut on high ground, well hidden in underbrush; United States Geological Survey standard iron post.....	81.414
Bench mark No. 6, northeastern point of ridge, about 0.1 mile west of outlet stream of Sandy Bottom Lake; United States Geological Survey standard iron post.....	72.910
<b>WEEKS ISLAND EAST ALONG CYPREMORT BRANCH SOUTHERN PACIFIC RAILROAD TO FLORENCE.</b>	
Cypremort, in front of station; top of rail.....	7.9
Cypremort, 600 feet east of station, 22 feet north of main track, at cattle guard; iron post stamped "8".....	7.722
Ivanhoe station, at road crossing; top of rail.....	7.6
Florence, in front of station; top of rail.....	7.7
<b>OLIVIER NORTHWEST ALONG SOUTHERN PACIFIC RAILROAD TO NEW IBERIA.</b>	
Olivier, in front of station; top of rail.....	21.7
Olivier, 54 feet west of station, 25 feet north of north track; iron post stamped "Prim. Trav. Sta. No. 29" and (erroneously) "21 LA".....	19.502
New Iberia, 2.8 miles east of, 225 feet west of highway crossing, 57 feet south of track; iron post stamped "17 LA".....	16.999
<b>JEANERETTE QUADRANGLE.</b>	
<b>COTE BLANCHE EAST ALONG CYPREMORT BRANCH OF SOUTHERN PACIFIC RAILROAD TO BALDWIN.</b>	
Cote Blanche, in front of station; top of rail.....	7.8
Cote Blanche station, 100 feet east of highway crossing, 20 feet north of center of track; iron post stamped "7".....	7.255
Glencoe, in front of station; top of rail.....	11.4
Glencoe, southeast corner of station, 5 feet north of platform steps, 30 feet north of main track; iron post stamped "10".....	9.591
Vacherie, 0.2 mile west of station, 240 feet west of highway crossing, 45 feet south of railroad and 15 feet southwest of corner of section tool house; iron post stamped "6 LA".....	6.131
Franklin and Abbeville Junction, 20 feet west of end of station, 18 feet north of track (Weeks Island Branch); iron post stamped "5 LA".....	5.103
Baldwin, in front of station; top of rail.....	13.0
Baldwin, 100 feet northwest of station, 25 feet west of center of highway, 15 feet south of switch; iron post stamped "11 LA".....	11.090
<b>BALDWIN NORTHWEST ALONG SOUTHERN PACIFIC RAILROAD TO OLIVIER.</b>	
Adeline, in front of station; top of rail.....	14.7
Adeline, 220 feet west of, about 30 feet north of track; iron post stamped "14 LA".....	13.887
Jeanerette, 0.8 mile east of, 30 feet east of highway, on St. Mary-Iberia Parish line, 45 feet north of north track; iron post stamped "17 LA".....	17.41
Jeanerette, in front of station; top of rail.....	18.8
Jeanerette, 1.1 miles west of, 57 feet south of railroad track, 45 feet west of center of highway, near fence; iron post stamped "17 LA".....	16.845

## ST. MARTINVILLE QUADRANGLE.

NEW IBERIA NORTHWEST ALONG SOUTHERN PACIFIC RAILROAD TO POINT 1.2 MILES EAST OF LAFAYETTE.

New Iberia, post-office building, in face of foundation at right of main entrance; aluminum tablet stamped "23 LA".....	Feet. 23.296
New Iberia, in front of station; top of rail.....	20.1
New Iberia, water tank opposite station, 55 feet east and 100 feet south of track; iron post.....	19.119
Segura, 600 feet west of station, in southwest corner of yard, 70 feet north of railroad; iron post stamped "28 LA".....	28.422
Burke, 28 feet north of track, 20 feet east of public highway; iron post stamped (erroneously) "27 LA".....	28.059
Burke, in front of station; top of rail.....	30.3
Duchamp, 20 feet east of public highway, 25 feet north of track; iron post stamped "Prim. Trav. Sta. No. 32, 33 LA".....	33.227
Duchamp, in front of station; top of rail.....	35.8
Billeaud sugar mill, 500 feet west of, 30 feet north of track; iron post stamped "35".....	35.385
Broussard, 30 feet east of station, 25 feet south of track, in corner of yard; iron post stamped "37 LA".....	36.938
Broussard, in front of station; top of rail.....	37.3
Landry, in front of station; top of rail.....	34.1
Landry, 0.6 mile west of station, 18 feet north of track, 20 feet west of public highway; iron post stamped "36 LA".....	36.705

## LAFAYETTE QUADRANGLE.

POINT 1.2 MILES EAST OF LAFAYETTE WEST ALONG SOUTHERN PACIFIC RAILROAD TO RAYNE.

Lafayette, 1.2 miles east of, 20 feet east of public highway, 30 feet south of track; iron post stamped "36 LA".....	35.857
Lafayette, in front of station; top of rail.....	39.5
Lafayette, freight house yard, southeast corner of, on Lincoln avenue; iron post stamped "Prim. Trav. Sta. No. 34, 39 LA".....	39.174
Lafayette, 1.6 miles west of, 125 feet west of cattle guard 147 B, 48 feet north of track, in angle of road; iron post stamped "37 LA".....	37.393
Scott station, section yard northwest of, in southeast corner; iron post stamped "36 LA".....	36.470
Scott, in front of station; top of rail.....	36.3
Duson, 1 mile east of, 12.5 feet south of track, opposite "mile to station" post; iron post stamped "33 LA".....	32.932
Duson, in front of station; top of rail.....	37.2
Duson, 25 feet west of, northwest corner of station, 50 feet north of track; iron post stamped "No. 36, 35 feet LA".....	35.277
Duson, 1.6 miles west of, 20 feet west of public highway, 15 feet south of track; iron post stamped "32 LA".....	32.239

## CROWLEY QUADRANGLE.

RAYNE WEST ALONG SOUTHERN PACIFIC RAILROAD TO MIDLAND.

Rayne, in front of station; top of rail.....	35.7
Rayne, southeast corner of section yard northwest of station; iron post stamped "No. 37, 32 LA".....	31.733
Rayne, 3.7 miles west of, 12 feet east of public highway crossing, 12 feet south of track, 90 feet west of milepost 164; iron post stamped "25 LA".....	25.249
Crowley, in front of station; top of rail.....	23.9



Crowley, 40 feet west of railroad crossing at Parkinson Avenue, 24.5 feet south of track; iron post stamped "No. 38, 24 LA".....	Feet. 23. 820
Crowley, 2.2 miles west of, north right of way line opposite milepost 169; iron post stamped "19 LA".....	18. 670
Etherwood, in front of station, 33 feet north of track; iron post stamped "17 LA".....	16. 544
Etherwood, in front of station; top of rail.....	19. 5
Midland, 400 feet east of station, 35 feet south of main line of Southern Pacific Railroad; iron post stamped "14 LA".....	14. 411

## LAKE ARTHUR QUADRANGLE.

## MIDLAND WEST ALONG SOUTHERN PACIFIC RAILROAD TO JENNINGS.

Mermenton, 1.3 miles east of, 135 feet east of milepost 179, 60 feet north of track; iron post stamped "10 LA".....	10. 457
Mermenton, in front of station; top of rail.....	16. 9
Mermenton, 190 feet west of, 35 feet south of south rail; iron post stamped "No. 41, 13 LA".....	12. 833
Jennings, 2.25 miles east of, 25 feet east of public highway crossing, 65 feet north of track; iron post stamped "18 LA".....	18. 344
Jennings, 300 feet west of old station, 55 feet south of track, 14 feet west of sidewalk; iron post stamped "No. 42, 29 LA".....	29. 070
Jennings, 0.4 mile west of, 115 feet west of signal tower 1858, 25 feet north of track; iron post stamped "25 LA".....	25. 445

## Colfax, Derry, and Winnfield quadrangles.

## GRANT AND WINN PARISHES.

The elevations in the following list were determined by a spur line of precise levels extended from bench mark No. 69 of the United States Army engineers at Colfax, La. This bench mark is a copper bolt in a buried stone surmounted by an iron pipe, the elevation of the cap of which is accepted as 100.349 feet above mean tide. A prism level and yard rods were used.

The leveling was done in October, 1906, by E. L. McNair.

## COLFAX QUADRANGLE.

## COLFAX ALONG TRACK OF LOUISIANA RAILWAY &amp; NAVIGATION CO. TO PHILLIPS.

Colfax, in sandstone water table in courthouse foundation, 3 feet north of main entrance; aluminum tablet stamped "103".....	Feet. 102. 517
Colfax, 12 feet west of track, 1 foot northeast of northeast corner of ticket office; iron post stamped "97".....	97. 446
Colfax, in front of station; top of rail.....	96. 8
Phillips station, west of track, 50 feet southwest of road crossing, 15 feet south of road, 18 feet southeast of sweet gum tree; iron post stamped "95".....	95. 407

## DERRY QUADRANGLE.

## PHILLIPS ALONG TRACK OF LOUISIANA RAILWAY &amp; NAVIGATION CO. TO LOFTON.

Aloha, 1 foot northeast of southeast corner of station; iron post stamped "Prim. Trav. Sta. No. 1, 1906, 101".....	101. 284
Aloha, in front of station; top of rail.....	101. 1

<sup>1</sup> This bench mark has been destroyed according to letter from G. C. Searlette, September 23, 1910.

## LOUISIANA.

31

Verda, 1.1 miles southwest of, east of track on right of way; iron post stamped "150".....	Feet. 149. 542
Verda, at northeast corner of ticket office at station; iron post stamped "Prim. Trav. Sta. No. 2, 1906, 157".....	156. 522
Verda, in front of station; top of rail.....	156. 0
Lofton, 180 feet north of station, 55 feet east of track, on right of way; iron post stamped "193".....	192. 963
Lofton, in front of station; top of rail.....	194. 5

## WINNFELD QUADRANGLE.

## LOFTON ALONG TRACK OF LOUISIANA RAILWAY &amp; NAVIGATION CO., TO WINNFELD.

Emden, 350 feet south of station, 55 feet east of track, on right of way, 30 feet south of switch stand; iron post stamped "214".....	213. 783
Emden, in front of station; top of rail.....	219. 5
Oakes, 120 feet south of road crossing, 50 feet east of track on right of way; iron post stamped "194".....	194. 420
Atlanta, at northwest corner of station ticket office, 12 feet east of track; iron post stamped "Prim. Trav. Sta. No. 3, 1906, 189".....	188. 642
Atlanta, 45 feet east of track, 10 feet south of road crossing, 40 feet west of northwest corner of Germain & Boyd's commissary; iron post stamped "188".....	187. 763
Atlanta, in front of station; top of rail.....	188. 1
Germain & Boyd's mill, at road crossing; top of rail.....	190. 5
Whitford, in front of station; top of rail.....	218. 5
Whitford station, 15 feet west of track, 2 feet south of Louisiana Lumber Co.'s commissary freight platform; iron post stamped "220".....	220. 299
Alonzo station, 12 feet west of track, on south side of freight platform; iron post stamped "Prim. Trav. Sta. No. 4, 183, 1906".....	182. 552
Alonzo, opposite water tank; top of rail.....	182. 3
Winnfield, 2 miles south of, 15 feet west of track, 10 feet south of private road crossing; iron post stamped "168".....	167. 200
Winnfield, in front of station; top of rail.....	117. 5
Louisiana Railway & Navigation Co. and Chicago, Rock Island & Pacific Railway crossing; top of rail.....	117. 5
Winnfield, southwest corner of station; iron post stamped "117".....	117. 325
Louisiana & Arkansas Railway and Chicago, Rock Island & Pacific Railway crossing; top of rail.....	118. 6
Winnfield, northwest corner of courthouse yard, 1.5 feet inside fence; iron post stamped "Prim. Trav. Sta. No. 5, 1906, 141".....	141. 181

## PRIMARY LEVELING.

## Winnfield quadrangle.

## WINN PARISH.

The elevations in the following list were determined by a spur line of primary levels from the courthouse at Winnfield from a bench mark of the line of precise levels run from Colfax, and checked by connection with secondary bench marks previously established by Prof. G. D. Harris.

The leveling was done in 1906 by E. L. McNair.

## WINNFIELD QUADRANGLE.

## WINNFIELD NORTHEAST ALONG ROAD TO FORKS OF ROAD IN SEC. 17, T. 11 N., R. 2 W.

Winnfield, northwest corner of courthouse yard, 1 foot inside fence; iron post stamped "Prim. Trav. Sta. No. 5, 1906, 141".....	Feet. 141.181
Winnfield courthouse, 2.8 miles northeast of, 0.25 mile east of Dugdermonn Creek, sec. 17, T. 11 N., R. 2 W.; iron post stamped "Prim. Trav. Sta. No. 13, 1906, 128".....	127.560

## WINNFIELD SOUTHEAST ALONG LOUISIANA &amp; ARKANSAS RAILWAY TO MOORE STATION. (SINGLE SPUR LINE).

Winnfield, at southwest corner of Louisiana Railway & Navigation Co. station; iron post stamped "117".....	117.325
Moore flag station, 20 feet east of center of track and 15 feet north of wagon road; iron post stamped "Prim. Trav. Sta. No. 9, 1906, 207".....	207.099

## MOORE NORTH ALONG CHICAGO, ROCK ISLAND &amp; PACIFIC RAILWAY TO TANNEHILL.

Winnfield, in front of Chicago, Rock Island & Pacific Railway station; top of rail.....	123.4
Tannehill station, south side of freight platform, 15 feet east of track; iron post stamped "Prim. Trav. Sta. No. 8, 1906, 136 ft.".....	136.053

## WINNFIELD NORTHWEST ALONG LOUISIANA &amp; ARKANSAS RAILWAY TO FAY SIDING. (SINGLE SPUR LINE.)

Winnfield, in front of Louisiana & Arkansas Railway station; top of rail ..	126.0
Fay siding, southwest corner of lumber shed, 20 feet north of Louisiana & Arkansas Railway track, 1 foot from corner of shed; iron post stamped "Prim. Trav. Sta. No. 7, 1906, 124".....	123.646

**Baton Rouge, Bayou Sara (30'), Grosse Tete, Port Vincent, and White Castle (15') quadrangles.**

## ASCENSION, EAST BATON ROUGE, WEST BATON ROUGE, EAST FELICIANA, WEST FELICIANA, IBERVILLE, AND POINTE COUPEE PARISHES.

The elevations in the following list were determined by primary leveling extended from the Mississippi River Commission precise level line along Mississippi River. The leveling east of the Mississippi River in Bayou Sara quadrangle is based only upon "P. B. M. XXXL" at the State capitol, Baton Rouge, the elevation of which is accepted as 62.148 feet above mean sea level.

The leveling was done in the Bayou Sara quadrangle in 1903 by C. H. Birdseye, W. E. Earle, D. C. Fugitt, C. McRae, and D. V. Vandiver, and in the Baton Rouge, Grosse Tete, Port Vincent, and White Castle quadrangles in 1905 by Fox Wood.

## BAYOU SARA QUADRANGLE.

## BATON ROUGE NORTH ALONG YAZOO &amp; MISSISSIPPI VALLEY RAILROAD TO STATE LINE.

Baker, 0.8 mile north of, at road crossing, north side of road, at east edge of railroad right of way; iron post stamped "85 BR".....	Feet. 84.934
Zachary, in east wall of bank 1.5 feet from front of building; aluminum tablet stamped "100 BR".....	99.450
Zachary, at road crossing; top of rail.....	100.9
Ethel, 250 feet west of station, in brick chimney on south end of Price Hotel; bronze tablet stamped "174 BR".....	173.731

Gurley, 200 feet north of road crossing, at west edge of railroad right of way; iron post stamped "211 BR" .....	Feet. 210. 585
Norwood, at northeast corner of D. C. Norwood's warehouse and store, in north wall; bronze tablet stamped "312 BR" .....	312. 626
SLAUGHTER ALONG YAZOO & MISSISSIPPI VALLEY RAILROAD (WOODVILLE BRANCH) WEST TO BAYOU SARA, THENCE NORTH TO LAUREL HILL, THENCE EAST ALONG HIGHWAY TO NORWOOD.	
Slaughter, 600 feet west of street running east-west, 100 feet north of station, in brick foundation pillar of northwest corner of Baptist Church; aluminum tablet stamped "134 BR" .....	134. 028
Jackson Road station, on Woodville branch of Yazoo & Mississippi Valley Railroad, 10 feet west of road, north edge of right of way; iron post stamped "117 BR" .....	116. 942
Riddle, 200 feet west of station, 5 feet south of trestle; iron post stamped "66 BR" .....	65. 726
St. Francisville, top step to northeast entrance to courthouse; aluminum tablet stamped "115 BR" .....	115. 026
Bayou Sara, 100 feet south of station, in brick building facing west, known as Meyer Hotel; bronze tablet stamped "48 BR" .....	48. 527
Converse, 0.8 mile south of station, 10 feet south of road crossing, west edge of right of way; iron post stamped "240 BR" .....	239. 970
Laurel Hill, 30 feet northwest of Mark Cowen's storehouse, 10 feet east of large magnolia tree; iron post stamped "304 BR" .....	304. 059
ETHEL NORTHEAST ALONG YAZOO & MISSISSIPPI VALLEY RAILROAD (CLINTON BRANCH) TO CLINTON, THENCE NORTHWEST ALONG HIGHWAYS TO NORWOOD.	
Clinton, in west side of courthouse; aluminum tablet stamped "213 BR" ..	213. 615
M'MANUS WEST ALONG JACKSON RAILROAD TO JACKSON, THENCE SOUTHWEST ALONG HIGHWAY TO BAYOU SARA.	
Jackson, northeast corner of Presbyterian Church at southeast corner of Church and Erie streets; bronze tablet stamped "159 BR" .....	159. 471
SLAUGHTER AND CLINTON TO OLIVE BRANCH, THENCE SOUTH-SOUTHWEST ALONG HIGHWAY TO BATON ROUGE.	
Olive Branch post office, 2.0 miles south of, 10 feet west of plank road, on boundary line between East Feliciana and East Baton Rouge parishes, in top of stone post; aluminum tablet stamped "134 BR" .....	134. 115
Fred, 3.5 miles south of, on plank road, 650 feet southwest of Shady Grove Church, 10 feet east of road; iron post stamped "75 BR" .....	75. 075
Howell, 1.5 miles north of, on plank road, 300 feet south of south bridge over Cypress Bayou; iron post stamped "61 BR" .....	61. 514
ARBROTH NORTHWEST ALONG TEXAS & PACIFIC RAILWAY TO NEW ROADS, THENCE NORTH TO BENCH MARK 160-3 OPPOSITE BAYOU SARA. <sup>1</sup>	
New Roads, west side of front door of courthouse; aluminum tablet stamped "39 BR" .....	39. 697
BATON ROUGE QUADRANGLE.	
BATON ROUGE NORTHEAST TO POOR HILL CHURCH.	
Baton Rouge, north end of lowest granite step of west entrance to the State Capitol, 4 feet from front of the step and 4 feet from the baluster; bottom of square in granite step .....	60. 390

<sup>1</sup> A line was run also between Port Allen and Arbroth, but no standard bench marks were established.

Baton Rouge, post office building on northwest corner of North Boulevard and Church street, southeast of colonade in front of building, in corner of water table; top of copper bolt leaded vertically.....	Feet. 59.055
Baton Rouge, 3 miles from, 250 yards north of turn in road at milepost 3, on Comite road; iron post stamped "54 ADJ 1903".....	53.773
Baton Rouge, 300 feet east of milepost 6, on Comite road, in front of J. E. Pratt's residence, corner of lot near road; iron post stamped "55 ADJ 1903".....	55.127
Poor Hill Church, on Comite-Baton Rouge road, in northwest corner of churchyard; iron post stamped "52 ADJ 1903".....	52.057

## BATON ROUGE SOUTHEAST TO ST. GABRIEL.

Arlington, 150 feet north of cotton gin, 40 feet west of station, southeast corner of yard; iron post stamped "22 ADJ 1903".....	22.308
Gardere, 1,000 feet north of station, 40 feet west of railroad, 15 feet north of dirt road, 250 feet east of sugar refinery on Chadsworth plantation; iron post stamped "24 ADJ 1903".....	24.455
Bayou Paul, in front of Jos. Byrne's store, 100 feet northeast of road crossing, 150 feet southeast of station; iron post stamped "17 ADJ 1903".....	17.333
St. Gabriel, 100 feet southwest of station, 2 feet east of Mississippi River Commission post; iron post stamped "22 ADJ 1903".....	21.899

## WEST BATON ROUGE SOUTH TO BATON ROUGE JUNCTION.

Cinclare, 50 feet north of station, 30 feet west of track, 15 feet north of dirt road leading west, 0.5 mile from sugar refinery; iron post stamped "20 ADJ 1903".....	19.620
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## PLAQUEMINE SOUTHEAST AND EAST TO ST. GABRIEL.

Plaquemine, in northwest corner of courthouse; tablet stamped "Prim. Trav. Sta. No. 9, 30 ADJ 1903".....	29.686
Plaquemine, corner Main and Church streets, in southwest corner of court-yard; iron post stamped "27 ADJ 1903".....	26.773
Plaquemine, 3 miles south of, 1 mile west of levee, 0.25 mile east of railroad, on east side of old Tennessee sugar house (brick), E. J. Gay's plantation; iron post stamped "18 ADJ 1903".....	17.787
Plaquemine, 4 miles east of, on George Rice's plantation "Allemania," northwest corner of, corner of yard of negro cabin, 1 mile northwest of Allemania sugar house, 40 feet back of levee of Mississippi River, 10 feet west of road along levee; iron post stamped "27 ADJ 1903".....	27.577

## POOR HILL CHURCH SOUTH TO FOREMAN.

Harelson's store, just across road west of store, north of east-west road, 8 miles east of Baton Rouge on Benton Ferry road; iron post stamped "51 ADJ 1903".....	50.555
Nesser, 40 feet north of post office building, 100 feet west of residence of W. S. Martin, on clay cut road, 10 feet west of road; iron post stamped "34 ADJ 1903".....	34.569
Foreman, 1,000 feet south of post office, corner of negro church; iron post stamped "24 ADJ 1903".....	23.829

## HARELSON'S STORE EAST TO LIVE OAK SCHOOLHOUSE (SPUR LINE).

Live Oak schoolhouse, on Perkins road, east side of schoolhouse; iron post stamped "45 ADJ 1903".....	44.437
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**GARDERE NORTHEAST TO MIDDLE HIGHLAND ROAD, THENCE SOUTHEAST TO KLEINPETER'S STORE, THENCE NORTHEAST TO NESSER.**

Trajers bridge, 0.3 mile south of, at T road intersection on Middle-Highland road (Perkins road), 50 feet south of negro cabin; iron post stamped "30 ADJ 1903" .....	Feet. 29. 825
Kleinpeter's store, on Perkins road; iron post stamped "40 ADJ 1903" (marked 40 through mistake).....	37. 008

**GROSSE TETE QUADRANGLE.**

**BATON ROUGE JUNCTION TO PLAQUEMINE.**

Baton Rouge Junction, 100 feet west of track, at southwest corner of hotel yard; iron post stamped "18 ADJ 1903" .....	18. 411
Plaquemine, 2.5 miles north of, west side of track, 40 feet from center of old levee, 100 feet north of bridge 88-A; iron post stamped "22 ADJ 1903" ..	21. 785

**PORT VINCENT QUADRANGLE.**

**FOREMAN SOUTH TO DUTCHTOWN.**

Hopeville, across road from Dr. J. A. Violet's office, 0.25 mile south of post office; iron post stamped "25 ADJ 1903" .....	24. 755
Prairieville, 500 feet north of Louisiana Railway & Navigation Co.'s track, 3 miles south of Hopeville, northwest corner of church; iron post stamped "22 ADJ 1903" .....	21. 776
Dutchtown, corner of warehouse opposite Picard's store; tablet stamped "Prim. Trav. Sta. No. 2, 18 ADJ 1903" .....	18. 199

**WHITE CASTLE QUADRANGLE.**

**DUTCHTOWN SOUTHWEST TO GEISMAR.**

Geismar, 2 miles east of, on Geismar & Picard's plantation, west side of road, inside field near fence, 10 feet north of road; iron post stamped "19 ADJ 1903" .....	18. 985
Geismar, 100 feet south of station, 40 feet west of track, near Mississippi River Commission post; iron post stamped "Prim. Trav. Sta. No. 3, 24 ADJ 1903" .....	23. 865

**Harrisonburg, Lake Providence, St. Joseph, Tallulah, and Vicksburg 30' quadrangles and several 7½' subdivisions (Tensas drainage district).**

**EAST CARROLL, WEST CARROLL, CONCORDIA, MADISON, AND TENSAS PARISHES.**

The elevations in the following list were determined by primary leveling extended from various bench marks of the Coast and Geodetic Survey and the Mississippi River Commission precise-level lines.

The leveling was done in 1909, in the Lake Providence quadrangle by H. W. Peabody and T. A. Green; in the Tallulah and Vicksburg quadrangles by W. H. Gray and Green; in the Harrisonburg quadrangle by Green; and in the St. Joseph quadrangle by Gray, Green, and Peabody.

This list is not arranged according to 7½' quadrangles. Gray's leveling was in the area of the 7½' sheets numbered 15, 23, 24, and 36; Peabody's in 1, 2, 4, 5, 6, 8, 9, and 36; and Green's in 2, 3, 4, 8, 13, 15, 16, 22, 23, 24, 26, 27, 33, 34, 36, 37, 38, 42, 46, 51, and 52.

## LAKE PROVIDENCE QUADRANGLE.

## POINT NEAR WILSON'S POINT SOUTHEAST AND SOUTH ALONG LEVEE TO COTTONWOOD.

Wilson's Point, in northeast corner of front yard of plantation dwelling; iron post stamped "109 LA".....	Feet. 109. 148
Cottonwood store, 1.5 miles north of, west side of road, north end of loop in levee, in east root of 36-inch pinoak tree; nail.....	108. 67
Cottonwood, at southeast corner of store; iron post stamped "Prim. Trav. Sta. No. 31 108".....	108. 047

## POINT NEAR WILSON'S POINT SOUTH, WEST, AND NORTH ALONG LEVEE ROAD AROUND OLD RIVER LAKE TO T. 23 N., R. 12 E., SEC. 9.

St. John's Church, northeast corner of, in west root of 36-inch cottonwood tree; nail.....	109. 56
Old Keys residence, 1,200 feet north of, 300 feet east of levee, 200 feet northwest of negro cabin, on south side of road, at gate to second-class T road south through fields to Cottonwood Landing; iron post stamped "Prim. Trav. Sta. No. 30 1909 LA 112".....	111. 332
Foster's gin, 1,800 feet west of, north side of road, in south root of 36-inch pecan tree; nail.....	110. 30
Brunett, 1 mile east of, north of road opposite road fork to Tyron, in front of Jacob Marcus's store; iron post stamped "Prim. Trav. Sta. No. 29 1909 LA 112".....	111. 750
Brunett P. O., north side of road by blacksmith shop, in south root of 20-inch cottonwood tree; nail.....	111. 28
Brunett, 1.4 miles west of, in southeast corner of forks of Shelburn and levee roads; iron post stamped "Prim. Trav. Sta. No. 28 1909 LA 107".....	107. 182
Millikin's, 2.2 miles south of, 1,500 feet north of sawmill, 60 feet west of road crossing at bridge 111, in southwest corner of crossroads; iron post stamped "Prim. Trav. Sta. No. 34 LA 1909 107".....	106. 414
Millikin's, 160 feet west of station, 40 feet north of east-west road, southeast corner of store of J. S. Millikin; iron post stamped "Prim. Trav. Sta. No. 35 LA 1909 109".....	108. 680
Millikin's, 1.7 miles north of, 1.2 miles south of Arkansas-Louisiana State line, on south edge of road leading west from Kilbourne, 50 feet west of crossing of St. Louis, Iron Mountain & Southern Railway; iron post stamped "Prim. Trav. Sta. No. 36 LA 1909 111".....	110. 766

## LEVEE SOUTHWEST TO SHELBURN.

Shelburn, at southeast corner of store building, 250 feet southwest of station; iron post stamped "Prim. Trav. Sta. No. 33 105".....	104. 743
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## SEC. 9, T. 23 N., R. 12 E., WEST AND SOUTHWEST TO SEC. 22, T. 22 N., R. 11 E.

Bayou Mason, 160 feet east of east end of Ashton's bridge, 50 feet east of second-class T road north, on north edge of road; iron post stamped "105 LA 1909 Prim. Trav. Sta. No. 37".....	105. 259
Five points, in southwest corner of intersection of north-south and east-west roads, in root on north side of 20-inch red oak tree; nail marked "128.35".....	128. 19
Kilbourne, 1.5 miles south of, 900 feet south of Y road junction, on east edge of Kilbourne-Oak Grove road, just south of lane to east, at Mr. Connell's; iron post stamped "Prim. Trav. Sta. No. 38 LA 1909 114"....	113. 584
Kilbourne, 2.3 miles south of, west side of road, 700 feet south of second-class road to west, in root on east side of 24-inch oak tree; nail marked "113.9".....	113. 77

<b>Kilbourne</b> , 4.2 miles south of, at north end of grass triangle, 100 feet north of four corners; iron post stamped "Prim. Trav. Sta. No. 39 1909 LA 118".....	Feet. 118. 098
<b>Kilbourne</b> , 5.4 miles south of, on east side of road, 400 feet north of forks, in root on east side of 30-inch oak stump; nail marked "117.24".....	117. 05
<b>Kilbourne</b> , 7 miles south of, west of road, 12 feet south of northeast corner of fence, 125 feet west of unoccupied house; iron post stamped "Prim. Trav. Sta. No. 40 1909 LA 119".....	118. 369
<b>Kilbourne</b> , 8.1 miles south of, west side of road, 20 feet south of junction with road running northwest, in root on west side of 20-inch oak tree; nail marked "114.64".....	114. 44

## SEC. 22, T. 22 N., R. 11 E., SOUTHWEST TO SEC. 20, T. 21 N., R. 11 E.

<b>Lane's Ferry</b> , about 200 feet west of, iron bridge over Bayou Mason, at northwest corner of crossroads; iron post stamped "Prim. Trav. Sta. No. 41 1909 LA 95".....	94. 755
<b>Bridge over Bayou Mason at Lane's Ferry</b> , 1.25 miles south of, east of road, near small bridge, in west root of 48-inch red oak; spike.....	95. 76
<b>Bridge over Bayou Mason at Lane's Ferry</b> , 2 miles south of, west side of road, 600 feet north of house on east side of road, in west root of 20-inch hickory tree; spike.....	106. 70
<b>Oak Grove</b> , 4 miles southeast of, 3.5 miles south of Lane's Ferry bridge, at northwest corner of forks of Floyd and Oak Grove roads; iron post stamped "Prim. Trav. Sta. No. 49 104".....	103. 873
<b>Lane's Ferry bridge</b> , 5 miles south of, 1 mile north of Corbin road, east side of road, in west root of 48-inch hickory tree; spike.....	103. 36

## POINT 2 MILES WEST OF CORBIN FERRY EAST TO FISHER'S SAWMILL AND SOUTHWEST TOWARD TENSAS BRIDGE.

<b>Corbin Ferry</b> , on north side of road about 150 feet west of Mason Bayou; iron post stamped "Prim. Trav. Sta. No. 50 92".....	92. 167
<b>Corbin Ferry</b> , 1 mile east of, south side of road, in north root of 24-inch thorn tree; nail.....	89. 91
<b>Fisher's sawmill</b> , 3 miles west of, 2.5 miles east of Corbin Ferry, at northwest corner of road forks near store; iron post stamped "Prim. Trav. Sta. No. 58 95".....	94. 700
<b>Fisher's sawmill</b> , 2.5 miles west of, north side of road, 100 feet west of house, in south root of 12-inch hickory tree; nail.....	92. 24

## BAXTER BAYOU WEST TO LANE'S FERRY.

<b>Lake Providence</b> , 7 miles northwest of, at south side of forks of Oak Grove and Shelburn roads, near head of Baxter Bayou; iron post stamped "Prim. Trav. Sta. No. 42 96".....	96. 172
<b>Oak Grove</b> , 6 miles east of, south side of road, 700 feet east of 40-foot bridge, in north side of 12-inch sweet gum tree; spike.....	93. 83
<b>Oak Grove</b> , 3 miles east of, in north root of 20-inch cottonwood tree at bend of road; spike.....	96. 38

## SECS. 30 AND 31, T. 21 N., R. 11 E., ABOUT 2 MILES WEST OF CORBIN FERRY.

<b>Bayou Mason (at Corbin Ferry)</b> , 2 miles west of, 4.5 miles west of Pioneer, at southwest corner of crossroads; iron post stamped "Prim. Trav. Sta. No. 51 92".....	91. 494
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## LAKE PROVIDENCE NORTHWEST ALONG LEVEE AND BAXTER BAYOU TO POINT NEAR SHELBURN.

Lake Providence, 0.35 mile above principal street and 350 feet back of inner base of berm of levee, 98.5 feet west from northeast corner of garden of Josephine Fitzgerald (colored); iron post, "Harmon 06" permanent bench mark 1 .....	Feet. 102.720
Lake Providence, at southeast corner of Lake and Davis Streets, on half-inch bolt head in top of hydrant.....	104.83
Lake Providence, 5 miles northwest of, 90 feet north of north end of iron bridge, 640 feet east of St. Louis, Iron Mountain & Southern Railway crossing Baxter Bayou road, near wire fence; iron post stamped "Prim. Trav. Sta. No. 27 1909 LA 106" .....	105.609

## LAKE PROVIDENCE NORTHEAST ALONG LEVEE TO POINT NEAR BENHAM POST OFFICE

Benham P. O., 1.5 miles south of, in southwest corner of fork of Tyrone and Levee roads; iron post stamped "Prim. Trav. Sta. No. 32 105" .....	104.528
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## LAKE PROVIDENCE SOUTH TO POINT NEAR MOUNT ZION, THENCE WEST 2 MILES.

Lake Providence, in southeast corner of courthouse yard; iron post stamped "Prim. Trav. Sta. No. 26 105" .....	104.891
Desona, in fence corner on north edge of public road, 40 feet east of store and 100 feet west of public road crossing St. Louis, Iron Mountain & Southern Railway; iron post stamped "Prim. Trav. Sta. No. 25 100" ...	99.864
Lake Providence, 5.5 miles southwest of, 80 feet southeast of house (negro cabin), in northeast corner of "Linnwood," plantation of Mr. T. J. Powell; iron post stamped "95 LA 1909" .....	95.405

## FISHER'S SAWMILL NORTHEAST TO LAKE PROVIDENCE.

Lake Providence, southwest of, northeast of Fisher's sawmill, on east edge of road running along east bank of Bayou Mason at junction with second-class T road east; iron post stamped "Prim. Trav. Sta. No. 43 97" .....	96.844
Sawmill, 2.2 miles north of, at west side of road, in east root of 20-inch thorn tree; spike .....	95.28

## LINNWOOD PLANTATION SOUTH AND WEST TO TENSAS BRIDGE.

Bear Wallow, 0.5 mile east of, at edge of woods, on north side of trail, in south base of 60-inch cypress snag; spike.....	88.54
Greenfield, 1 mile west of, about 300 feet east of fork, at north side of road, in south root of 30-inch oak; nail.....	95.13

## AT TENSAS BRIDGE 7 MILES SOUTHWEST OF LAKE PROVIDENCE.

Lake Providence, 7 miles southwest of, 300 feet east of Tensas bridge, in northeast corner of road forks; iron post stamped "Prim. Trav. Sta. No. 47 92" .....	91.851
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## DESONA SOUTH ALONG ST. LOUIS, IRON MOUNTAIN &amp; SOUTHERN RAILWAY TO TALLA BENA.

Desona, 2.8 miles south of, 200 feet southeast of milepost 515, on north edge of east-west road, 40 feet east of railroad crossing at Eastland; iron post stamped "97 LA 1909 Prim. Trav. Sta. No. 24" .....	96.513
Transylvania, 1,100 feet south of station, at T road north, 2 feet west of crossing sign at road crossing, on north edge of east-west road, 20 feet east of main track; iron post stamped "Prim. Trav. Sta. No. 23 LA 102 1909" .....	102.090
Alsatia, 900 feet south of station, 70 feet east of center of tracks, 80 feet southeast of road crossing, at northwest corner of Outpost Planting Co.'s store; iron post stamped "Prim. Trav. Sta. No. 22 90 LA 1909" .....	90.049

Roosevelt, 90 feet east of track, 60 feet south of public road, in angle of porch and front steps to McKenzie Mercantile Co.'s store; iron post stamped "89 LA 1909 Prim. Trav. Sta. No. 21".....	Feet. 88.935
Enoka, 550 feet southeast of station, at southwest corner of Baptist church; iron post stamped "87 LA 1909 Prim. Trav. Sta. No. 20".....	86.684
Enoka, 1.6 miles south of, 300 feet south of milepost 530, top of first bolt from south end on west side of railroad bridge No. 172; marked "87.08"...	86.93

## VICKSBURG QUADRANGLE (INCLUDING NOS. 24 AND 25 7½' QUADRANGLES).

## DELTA NORTHWEST ALONG VICKSBURG, SHREVEPORT &amp; PACIFIC RAILWAY TO POINT NEAR MOUND.

Delta, top of cap on iron post at northeast corner of section house 7 (Mississippi River Commission bench mark).....	90.541
Delta, at southwest corner of porch of small dwelling, facing Vicksburg, Shreveport & Pacific Railway, situated on railroad lot on the east corner of its junction with T street, 100 feet north of main line; iron post stamped "Prim. Trav. Sta. No. 1 90 LA 1909".....	89.638
Delta, 0.8 mile northwest of, 60 feet south of road crossing, 40 feet east of wagon road, in top of limestone post dressed to 14 by 14 inches at top and bearing the characters "U. S. C. S. 1878;" copper bolt (bench mark "Southwest Base").....	87.793
Delta, 2.9 miles northwest of, 80 feet south of road crossing, west of milepost 3, on east side of wagon road, 10 feet west of ditch; iron post stamped "87 LA 1909".....	87.457

## TALLULAH QUADRANGLE (INCLUDING NOS. 15 TO 18, 20 TO 23, 26 TO 29, AND 32 TO 35 7½' QUADRANGLES).

## POINT NEAR MOUNDS NORTHWEST ALONG VICKSBURG, SHREVEPORT &amp; PACIFIC RAILWAY TO TALLULAH.

Mounds, 150 feet south of railroad crossing, at northwest corner of Maxwell Yerger Co.'s store; iron post stamped "Prim. Trav. Sta. No. 2 90 LA 1909".....	89.960
Thomastown, at southeast corner of F. P. Moore's store, 125 feet northwest of road crossing; iron post stamped "Prim. Trav. Sta. No. 3 92 LA 1909".	91.477
Barnes, at southeast corner of store of Gassaway & Warren, 80 feet north of road crossing of Vicksburg, Shreveport & Pacific Railway (main track), 40 feet northeast of northwest corner of cotton platform; iron post stamped "Prim. Trav. Sta. No. 4 85 LA 1909".....	85.366
Lums, 75 feet north of railroad crossing at milepost 15, 10 feet west of county road, 75 feet east of bayou, at southeast corner of fence; iron post stamped "Prim. Trav. Sta. No. 5 85 LA 1909".....	84.709
Tallulah, in southwest corner of iron fence around Madison Parish courthouse; iron post stamped "Prim. Trav. Sta. No. 6 85 LA 1909".....	85.104

## POINT NEAR TALLA BENA SOUTH ALONG ST. LOUIS, IRON MOUNTAIN &amp; SOUTHERN RAILWAY TO TALLULAH.

Talla Bena, 100 feet east of railroad, 80 feet south of Caltharp's store, in corner of fence; iron post stamped "Prim. Trav. Sta. No. 13 87 LA 1909".	86.608
Mansford, 1 mile northwest of, 350 feet north of milepost 532; top of third bolt from south end of east guard rail on bridge 179; marked "U. S. B. M. 86.1".....	86.03
Mansford, at northwest corner of W. H. Ward's store, 150 feet east of railroad; iron post stamped "Prim. Trav. Sta. No. 12 85 LA 1909".....	84.550
Mansford, in front of station; top of rail.....	87.6

Tallulah, 3.2 miles north of, 40 feet west of railroad, at northwest corner of intersection of old tram road and railroad; iron post stamped "82 LA 1909 Prim. Trav. Sta. No. 11" .....	Feet. 81.800
<b>TALLULAH SOUTH ALONG ST. LOUIS, IRON MOUNTAIN &amp; SOUTHERN RAILWAY TO LAKE BRUIN.</b>	
Tallulah, in southwest corner of courthouse yard; iron post stamped "Prim. Trav. Sta. No. 6 85 LA 1909" .....	85.104
Laclede, 1,000 feet south of station, 60 feet southwest of public road crossing, in northwest corner of fence; iron post stamped "Prim. Trav. Sta. No. 10 85 LA 1909" .....	84.445
Laclede, 3.6 miles south of, opposite Kinderhook's sawmill, at northwest corner of section foreman's house, 100 feet southeast of old road crossing; iron post stamped "Prim. Trav. Sta. No. 9 80 LA 1909" .....	79.644
Alligator Bayou, 700 feet north of water tank, 25 feet east of center of railroad, at southwest corner of section foreman's house; iron post stamped "Prim. Trav. Sta. No. 66 80 LA 1909" .....	79.931
Quimby station, 95 feet due east of, center of east wall of, 40 feet north along fence line from center of public road leading to station, in corner of wire fence; iron post stamped "Prim. Trav. Sta. No. 67 84 LA 1909" ..	84.334
Somerset, 465 feet northeast of station, on west edge of public road, on south side of road leading to station, at corner of fence; iron post stamped "Prim. Trav. Sta. No. 72 86 LA 1909" .....	85.746
Somerset, in front of station; top of rail .....	85.25
Balmoral spur, 528 feet southwest of, 28 feet due east of trestle 233, southeast of railroad crossing, on south edge of public road, 5 feet east of crossing sign; iron post stamped "Prim. Trav. Sta. No. 73" .....	80.599
Franklin spur, 60 feet southwest of railroad crossing, 20 feet south of public road, in northeast corner of fence; iron post stamped "Prim. Trav. Sta. No. 74 80 LA 1909" .....	80.322
Newellton, 147 feet northeast of the northeast corner of railroad station, at northwest corner of old store, on north side; iron post stamped "Prim. Trav. Sta. No. 75 77 LA 1907" .....	76.832
Cohn's spur, 30 feet east of railroad crossing, 40 feet south of signboard, on south edge of east-west second-class road, 1 foot south of crossing sign; iron post stamped "Prim. Trav. Sta. No. 76 74 LA 1909" .....	73.729
<b>ST. JOSEPH NORTH AND WEST TO LAKE BRUIN (PORTION OF LINE.)</b>	
Raritan plantation, 200 feet east of plantation house, 250 feet south of Lake St. Joe, on south edge of main east-west road; iron post stamped "Prim. Trav. Sta. No. 81 79 LA 1909" .....	78.839
<b>HONEYSUCKLE HOUSE EAST TO BRIDGE OVER BOILING SPRING BAYOU.</b>	
Saranac store, northwest corner, 1 mile southeast of Saddletree Lake, near T road south to Delta bridge; iron post stamped "71 LA 1909 Prim. Trav. Sta. No. 85" .....	70.774
Saranac store, 1 mile southeast of, 265 feet southeast of center of wagon bridge over Boiling Springs Bayou, at southwest corner of wire fence, in hub on 12-inch live oak tree; nail marked "68.24" .....	68.23
<b>TALLA BENA SOUTHWEST AND SOUTH ALONG ROAD TO TALLULAH.</b>	
Talla Bena, 110 feet east of railroad, 120 feet south of Coltharp & Co.'s store, in fence corner; iron post stamped "87 LA 1909 Prim. Trav. Sta. No. 13" .....	86.608

Talla Bena, 1.4 miles southwest of, on east side of road, 40 feet east of northeast corner of old church, in root of 8-inch locust tree; nail marked "85.2" .....	Feet. 85.14
Inverness plantation, 1.1 miles southeast of, 5 feet east of levee, in root of 10-inch poplar tree standing in ditch; nail marked "81.4" .....	81.38

## TALLA BENA EAST AND SOUTH ALONG ROAD TO LUMS.

Talla Bena, 1.1 miles east of, 20 feet north of road, on north side of ditch, in root on north side of 36-inch elm tree; nail marked "U. S. B. M. 86.5" .....	86.50
Buckhorn, 240 feet west of T road junction, 10 feet north of east-west road, 30 feet south of poplar tree; iron post stamped "Mississippi River Commission U. S. B. M. 1908" .....	91.130
Ashley, 1 mile south of, 1,800 feet northwest of Hew's store, 50 feet northeast of T road junction, 5 feet south of fence; iron post stamped "Prim. Trav. Sta. No. 16 89 LA 1909" .....	89.194
Lums, 80 feet north of railroad at milepost 15, 20 feet west of county road, south of fence corner; iron post stamped "85 LA 1909 Prim. Trav. Sta. No. 5" .....	84.709

## THOMASTOWN NORTH ALONG HIGHWAYS TO HUON, THENCE EAST TO DUCKPORT, THENCE SOUTH TO MOUND.

Huon Store, 300 feet northeast of, in center of triangle formed by Tallulah, Duckport, and Thomastown roads, in ground 1 foot above surface; iron post .....	92.029
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## MILLIKEN'S BEND SOUTHEAST ALONG LEVEE ROAD TO DUCKPORT.

Milliken's Bend, 2 feet northeast of C. A. Chan's store porch, 0.2 mile northeast of levee; iron post stamped "Prim. Trav. Sta. No. 16 94 LA 1909" .....	93.627
Milliken's Bend, 2 feet northeast of northeast corner of C. E. Chan's drug store, set in ground 2 feet above surface, iron post not stamped; top of cap marked "Mississippi River Commission U. S." .....	94.930

## LUMS SOUTH TO BLUEFRONT STORE, THENCE EAST TO MOUND.

Lums, 75 feet north of railroad crossing at milepost 15; iron post stamped "Prim. Trav. Sta. No. 5 85 LA 1909" .....	84.709
Lums, 2.5 miles south of, 15 feet west of north-south road, 150 feet southeast of wagon bridge across Walnut Bayou, 25 feet south of fence corner; iron post stamped "86 LA 1909" .....	86.398
Fortune Fork, 2 miles southeast of, 15 feet north of road, at southwest corner of fence, 200 feet west of footbridge over Walnut Bayou; iron post stamped "85 LA 1909" .....	85.240
Bluefront store, 745 feet southeast of, south side of road, in root of china-berry tree; nail marked "U. S. B. M. 90.6" .....	90.517
Bluefront store, 0.9 mile southeast of, 35 feet south of main road, 40 feet west of road running south, at negro cabin; iron post stamped "Prim. Trav. Sta. No. 61 91 LA 1909" .....	90.485
Coleman, 1.6 miles east of, 8 feet south of highway, 20 feet south of center of wagon bridge over Cross Bayou, 2 feet north of fence around F. L. Maxwell's residence; iron post stamped "88 LA 1909" .....	87.525
Mound, south of, at forks of road, in root of pecan tree; nail marked "88.5" .....	88.47
Mound, at northwest corner of Maxwell Yerger Co.'s store; iron post stamped "Prim. Trav. Sta. No. 2 90 LA 1909" .....	89.860

## POINT 1.6 MILES EAST OF COLEMAN SOUTH TO CRYSTAL SPRINGS PLANTATION.

Coleman, 1.6 miles east of, 8 feet south of highway, 20 feet south of center of bridge over Cross Bayou, 2 feet north of fence around F. L. Maxwell's residence; iron post stamped "88 LA 1909".....	Feet. 87.525
Cross Bayou bridge, 3.8 miles south of, in swamp on north side of lake, on north side of 48-inch cypress tree, in hub; nail marked "76.48" .....	76.46
Crystal Springs plantation, east chimney of dwelling house of O. Christmas, second brick from southeast edge of chimney in twelfth course above ground; center of head of copper bolt leaded horizontally; Mississippi River Commission permanent bench mark "232" .....	87.862

## LACLEDE EAST TO BLUEFRONT STORE.

Laclede, 2.8 miles southeast of, 60 feet west of road, 15 feet south of road running west at schoolhouse; iron post stamped "Prim. Trav. Sta. No. 63 87 LA 1909" .....	87.056
St. James Church, at east end of front entrance, on north side; iron post stamped "Prim. Trav. Sta. No. 62 1909 LA 87" .....	87.057
St. James Church, 1.8 miles northeast of, west side of road, north end of woods, in east side of small locust tree; nail marked "85.13" .....	85.02

## ST. JAMES CHURCH SOUTH AND EAST TO CHELULA.

Cape plantation house, 400 feet east of, 0.7 mile north of Solomon's Temple Church, 30 feet east of center of Roundaway Bayou road, about center of large grass triangle at junction of second-class road leading east over plank bridge, about 200 feet west of center of bridge; iron post stamped "Prim. Trav. Sta. No. 64, 83 LA 1909" .....	82.833
Solomon's Temple Church, 0.4 mile south of, at forks of road, on east side of 12-inch live-oak tree 40 feet south of four corners, in hub; nail marked "81.9" .....	81.71
Chelula (3 miles southeast of Solomon's Temple Church), 150 feet north of levee, 20 feet east of road to north which crosses levee on a large ramp, about 2.5 miles above King post office; iron post (Mississippi River Commission bench mark "Chelula," in bad shape, loose and battered) .....	78.997

## ST. JOSEPH QUADRANGLE.

(INCLUDING NOS. 36 TO 38, 41 TO 45, AND 52 7½' QUADRANGLES.)

## LAKE BRUIN STATION SOUTH ALONG ST. LOUIS, IRON MOUNTAIN &amp; SOUTHERN RAILWAY AND HIGHWAY TO ST. JOSEPH.

Lake Bruin, 800 feet southeast of station, at southwest corner of second-class road to station; iron post stamped "Prim. Trav. Sta. No. 82, 76" ..	75.854
Osceola, 0.1 mile south of, 2 miles south of Lake Bruin station, on north edge of second-class road, 30 feet north of railway crossing, 40 feet southeast of trestle over irrigating canal, 2 miles north of St. Joseph station; iron post stamped "Prim. Trav. Sta. No. 77, 74 LA 1909" .....	74.285

## ST. JOSEPH SOUTHWEST ALONG ST. LOUIS, IRON MOUNTAIN &amp; SOUTHERN RAILWAY TO LOCUST RIDGE.

St. Joseph, near east projection of courthouse, 21 feet from northeast corner and 22 feet from southeast corner, 3 inches below ground, in box; marble post (Coast and Geodetic Survey bench mark) .....	72.110
St. Joseph, 600 feet east of courthouse, 45 feet west of old Masonic Hall, top of iron post (Mississippi River Commission primary bench mark "St. Joseph," Commission's elevation figures 74.771) .....	74.640

St. Joseph, 600 feet east of Tensas Parish courthouse, 225 feet west of levee, 42 feet west of southwest corner of old Masonic Hall, 25 feet south of Mississippi River Commission iron post, 25 feet southeast of 36-inch gum tree; iron post stamped "Prim. Trav. Sta. No. 78, 74 LA 1909" .....	Feet. 74.029
St. Joseph, 0.7 mile west of junction of plank and levee roads, 0.3 mile east of railroad station, on south edge of plank road, in hub on 20-inch locust tree; nail marked "69.65" .....	69.52
Locust Ridge, 3.9 miles northeast of, 55 feet north of center of tracks, 20 feet west of second-class road, 225 feet southwest of telegraph pole marked "576-5"; iron post stamped "65 LA 1909" .....	65.268
Locust Ridge, 3.9 miles northeast of, 55 feet north of center of tracks, 20 feet west of second-class road, in base of 12-inch sweet gum tree; spike marked "64.927" .....	64.86
Locust Ridge, 380 feet north of station, at southwest corner of porch of Locust Ridge plantation store; iron post stamped "Prim. Trav. Sta. No. 94, 69 LA 1909" .....	68.724
<b>POINT NEAR ST. JOSEPH ALONG HIGHWAY NORTH AND WEST TO LAKE BEUIN (PORTION OF LINE).</b>	
St. Joseph, 2.8 miles northeast of, 1 mile south of Pleasant View Church; iron post stamped "Prim. Trav. Sta. No. 79, 78" .....	77.966
Pleasant View Church, 1 mile north of, in root of 16-inch oak tree; nail marked "73.93" .....	73.90
St. Joseph, 5 miles north of, 75 feet north of Catfish Bayou, 800 feet northeast of James Curry's house; iron post stamped "Prim. Trav. Sta. No. 80, 76" .....	76.413
<b>ST. JOSEPH ALONG HIGHWAY NORTHWEST TO AVONDALE, THENCE NORTH AND EAST TO OSCEOLA.</b>	
Avondale, 1.2 miles north of, on east side of road, 175 feet northeast of Jerry Lewis's cabin, in hub on west side of 10-inch chinaberry tree which stands 18 feet east of a similar tree; nail marked "72.96" .....	72.83
<b>POINT 1.3 MILES WEST OF OSCEOLA WEST TOWARD GOLD BELL CHURCH (SINGLE SPUR LINE CHECKED BY SECONDARY LEVELS).</b>	
Buckhorn, 0.4 mile southwest of, 30 feet south of dim road to west, on east side of road to south, in hub on root of 8-inch sweet gum tree; nail marked "T. P. 70.11" .....	69.99
<b>AVONDALE ALONG HIGHWAY SOUTHWEST TO ONEONTA, THENCE SOUTH TO LOCUST RIDGE.</b>	
Avondale, 3 miles southwest of, main forks of road at Hubbard's bridge, at junction of telephone lines, 4 feet northeast of center of grass triangle, 120 feet northeast of north end of bridge; iron post stamped "66 LA 1909" .....	66.310
Oneonta, 125 feet north of plantation house, south side of road, in hub on south side of 48-inch water oak tree; nail marked "70.04" .....	69.88
Oneonta, 250 feet west of plantation house, 53 feet southeast of commissary, 3 feet south of telephone pole; iron post stamped "Prim. Trav. Sta. No. 88, 71 LA 1909" .....	70.663
Cross Keys store, set in southwest corner of cross roads at, 60 feet east to store door, 25 feet southeast to corner of icehouse; iron post stamped "70 LA 1909 Prim. Trav. Sta. No. 89" .....	69.880
<b>AVONDALE ALONG HIGHWAY WEST TO DELTA BRIDGE, THENCE SOUTHEAST TO ONEONTA.</b>	
Hunt's bridge, 69 feet west of south end, 30 feet northwest of T road junction; iron post stamped "Prim. Trav. Sta. No. 83, 73 LA 1909" .....	72.970
Hunt's bridge, 2.6 miles southwest of, north side of road, 200 feet north of cabin occupied by Hilliary Buford, in hub on bench on east side of 48-inch live oak tree; nail marked "71.956" .....	71.81

Hunt's bridge, 2.7 miles west of, northwest corner of fence around Hiliary Buford's garden, 15 feet south of center of road, 40 feet south of row of four large live oak trees and one pecan tree, 300 feet southeast of a large pecan tree standing alone on south edge of road; iron post stamped "72 LA 1909" .....	Ft. 71. 896
Hunt's bridge, 3.8 miles west of, north side of road, 1,000 feet west of road to north across bayou, in hub on south side of 48-inch pecan tree; nail marked "70.23" .....	70. 08
Hunt's bridge, 4.3 miles west of, 35 feet northwest of T road junction, on south side of bayou, 400 feet south of large brick chimney at Daniel's cotton gin, in hub on root on southeast side of twin locust tree; nail marked "68.7" .....	68. 56
Deltabridge, 90 feet west of west end of iron bridge over bayou, 30 feet west of forks of road, 20 feet south of southeast end of doctor's office; iron post stamped "Prim. Trav. Sta. No. 87, 71 LA 1909" .....	70. 753
HUNT'S BRIDGE ALONG HIGHWAY NORTHWEST TO GOLD BELL CHURCH, THENCE SOUTH TO DELTABRIDGE.	
Hunt's bridge, 69 feet southwest of south end of, 30 feet northwest of T road junction; iron post stamped "Prim. Trav. Sta. No. 83, 73 LA 1909" ....	72. 970
Gold Bell Church, 300 feet east of, 800 feet northwest of Crimea house, beside paling fence on east edge of road, near forks; iron post stamped "Prim. Trav. Sta. No. 84, 70 LA 1909" .....	70. 324
Gold Bell Church, 2 miles southwest of, 40 feet west of road, on east side of small levee, in hub on root of 48-inch cottonwood tree; nail marked "68.03" .....	68. 03
Gold Bell Church, 3.2 miles southwest of, on east edge of road in woods, in west base of tall 48-inch gum tree; spike marked "68.61" .....	68. 62
Deltabridge post office, about 0.25 mile northeast of, 400 feet west of forks, north edge of main St. Joseph-Deltabridge road, in hub on line 26-inch gum tree; nail marked "T. P. 70.39" .....	70. 24
DELTABRIDGE ALONG HIGHWAY NORTHWEST TO HARD BARGAIN, THENCE NORTHEAST TO SARANAC STORE, THENCE SOUTHEAST TO GOLD BELL CHURCH (PORTION OF LINE).	
Deltabridge, 90 feet west of west end of iron bridge over bayou, 30 feet west of forks of road, 20 feet south of southeast end of doctor's office; iron post stamped "Prim. Trav. Sta. No. 87, 71 LA 1909" .....	70. 753
Deltabridge, 2.9 miles north of, 993 feet north of Mayflower bridge, on east edge, of road, 110 feet south of road to west at schoolhouse, in hub on west side of elm tree 60 inches in diameter; nail marked "66.31" .....	66. 29
Deltabridge, 3.4 miles north of, at Hard Bargain plantation, 3.0 miles southwest of Saranac store, on west edge of road, 600 feet south of Hard Bargain house, 30 feet east of doctor's office, 20 feet south of road to west; iron post stamped "Prim. Trav. Sta. No. 86, 71 LA 1909" .....	70. 757
Gold Bell Church, 300 feet east of, on east edge of road, near forks; iron post stamped "Prim. Trav. Sta. No. 84, 70 LA 1909" .....	70. 324
VIDALIA ALONG ROAD NORTHWEST TO TRESTLE 11, THENCE SOUTH TO SCOTLAND PLANTATION, THENCE NORTHEAST TO VIDALIA (PORTION OF CIRCUIT).	
Vidalia, on right bank in lot immediately back of lot on which stand courthouse and jail, 262.48 feet (80 meters) back of levee, 176.66 feet (54 meters) from upper back corner of courthouse, 79 feet (24.1 meters) from upper back corner of iron fence surrounding courthouse and jail (Coast and Geodetic Survey triangulation east base), in stone post 14 inches square; copper bolt (the figures 1878 are cut on the side next the river, and the letters "U. S. Coast S." on the opposite side) (Coast and Geodetic Survey bench mark LXIII) .....	61. 390

Vidalia, in courthouse yard, center of cross in stone post 5 by 7 inches, 5 feet northwest of gallery at recorder's office (reference mark to base line)....	Feet. 62. 65
Vidalia, at southwest corner inside of iron picket fence around courthouse; iron post stamped "Prim. Trav. Sta. No. 103, 63 LA 1909".....	62. 792
Vidalia, 0.3 mile northwest of courthouse, 1,483 feet (452 meters) back of levee along Trinity Street (now Concordia Avenue), on southwest side of street, 21.25 feet (6 meters) from center of street, 37.0 feet (11.3 meters) in front of the front tree of two large pecan trees standing about 130 feet apart, above upper side of road; top of iron post (Mississippi River Commission bench mark 132/3).....	64. 840
Taconey plantation, near, 5 feet north of telephone pole at angle in road, 25 feet north of gate, 100 feet southwest of top of levee at bend in levee, 150 feet west of gate across second-class road to south, 500 feet east of Taconey plantation house; iron post stamped "Prim. Trav. Sta. No. 102 LA 1909".	63. 415
Scotland plantation, 250 feet west of plantation house, on south side of river road, directly opposite second-class road to north through line of cabins, in hub on root on northwest side of dead 20-inch cottonwood tree; nail marked "62.98".....	62. 867
White Hall plantation store, 50 feet east of the southeast corner of, 5 feet northeast of chinaberry tree on north edge of levee road, 60 feet northeast of road crossing White Hall Lake on a ramp; iron post stamped "Prim. Trav. Sta. No. 106, 62 LA 1909".....	62. 134
Vidalia, 175 feet southwest of St. Louis, Iron Mountain & Southern Railway station, 110 feet southeast of Marx and Scharff's warehouse; top of bolt on dome of municipal water plug; marked "63.61".....	63. 46
Vidalia, on curbstone in front of Beer, Myers & Co.; chiseled square marked "63.39".....	63. 24

## HARRISONBURG QUADRANGLE (INCLUDING NOS. 46 TO 51 7½' QUADRANGLES).

VIDALIA ALONG ROAD NORTHWEST TO TRESTLE 11, THENCE SOUTH TO SCOTLAND PLANTATION, THENCE NORTHEAST TO VIDALIA (PORTION OF CIRCUIT).

Trestle 11, 1 mile southwest of, on east side of road, 65 feet south of two blazed oak trees, in hub on twin sweet gum tree; nail marked "53.07"...	53. 01
Scotland plantation, 1.7 miles north of, east side of road, in hub on 26-inch sweet gum tree; nail marked "52.38".....	52. 32

POINT NEAR MINORCA NORTHWEST ALONG ROAD TO FERRIDAY, THENCE SOUTH ALONG RAILROAD TO LUCERNA, THENCE NORTHEAST ALONG HIGHWAY TO SCOTLAND.

Minorca, 1.1 miles northwest of, at second-class road to south through gate, at railroad trestle 11, in root of dead stump 30 feet west of road junction; nail; mark on fence 10 feet south "B. M. 59.45".....	59. 384
Minorca, 2.1 miles northwest of, 3.5 miles southeast of Ferriday, at corner of wire fence, 15 feet east of southeast corner of negro church on south side of levee road; iron post stamped "Prim. Trav. Sta. No. 101, 63 LA 1909".	63. 069
Sycamore store, 77 feet west of southwest corner of, 9 feet south of ditch, 210 feet back of bank of lake, 115 feet back of center of levee, about half way between store and gate to road leading back to plantation house; tile and pipe (Mississippi River Commission permanent bench mark "Sycamore").	66. 030
Ferriday, 1,600 feet west of station, in northeast corner of wire fence surrounding public schoolhouse; iron post stamped "59 LA 1909 Prim Trav. Sta. No. 100".....	59. 434
Ferriday, 50 feet west of railroad, 37 feet south of roadmaster's office (St. Louis, Iron Mountain & Southern Railway), highest point on stopcock on water plug; mark on telegraph pole 20 feet northeast "B. M. 61.73"....	61. 76



Ferriday, 2.1 miles south of, 100 feet east of railroad, 450 feet northeast of milepost 197, 205 feet northeast of second-class road crossing, in north-west corner of wire fence around southern of two negro cabins, on property of Mr. Smith, of Texas & Pacific Railway, 20 feet east of 16-inch elm tree; iron post stamped "Prim. Trav. Sta. 108, 55 LA 1909".....	Feet. 54. 922
Lucerna, 0.9 mile north of, 50 feet west of center of tracks, on west side of wire fence, 350 feet north of milepost 194; iron post stamped "51 LA 1909".....	51. 123
Bash station, 0.9 mile east of, 100 feet west of center of levee, 50 feet west of center of levee road, 15 feet north of T road leading west between Lucerna and Saughy plantations, 0.5 mile southeast of Lucerna plantation house; iron post stamped "63 LA 1909 Prim. Trav. Sta. No. 107".....	63. 018
Lucerna plantation, opposite the sixth milepost below Vidalia, 365 feet (111 meters) back of center of levee, 27.77 feet (9 meters) above center of a ditch, which leads back past a metal-covered gin, 413.5 feet (124 meters) above a road crossing levee and running back past plantation house, about 250 feet above a string of cabins; tile and pipe (Mississippi River Commission permanent bench mark "Lucerna").....	62. 600
Scotland, 1.1 miles west of, 12 feet north of road, 5 feet south of fence, on top of cement and brick cistern; chiseled square marked "65.92".....	65. 82

## MISSISSIPPI.

### PRECISE LEVELING.

Tunica and Tutwiler 30' quadrangles (including Banks, Belen, Crenshaw, Lake Cormorant, Lambert, Prichard, Sledge, Tibbs, Tutwiler, and Vance 7½' quadrangles—names not given in list).

#### DESOTO, PANOLA, QUITMAN, TALLAHATCHIE, TATE, AND TUNICA COUNTIES.

The elevations in the following list are a portion of those determined by a spur line of precise levels run from Memphis, Tenn., to Tutwiler, Miss. A prism level and yard rods were used, and the line was leveled in both forward and backward directions, broken by bench marks into sections about 1 mile long, the closure error in feet of which was limited to  $0.017\sqrt{D}$  ( $D$  being the distance between bench marks in miles). At Tutwiler, checked primary levels of the Tallahatchie Drainage Commission extended from bench marks at Mattson and Greenwood, Miss., on precise-level lines of the United States Corps of Engineers, corrected to this datum, closed plus 0.212 and plus 0.082 feet, respectively, prior to their adjustment.

The leveling was done in 1908, in the Tunica 30' quadrangle by W. H. Monahan and in the Tutwiler 30' quadrangle by Monahan and C. J. Harrison. A few standard iron posts and concrete monuments, descriptions of which are included in this list, were established by L. W. Mashburn, under the direction of A. L. Dabney, assistant chief engineer, Tallahatchie Drainage Commission.

## TUNICA QUADRANGLE.

STATE LINE NEAR DARWIN, TENN., SOUTH ALONG YAZOO &amp; MISSISSIPPI VALLEY RAILROAD TO CRENSHAW.

	Feet
Lake View, 159 feet west of track, 15 feet east of northeast corner of pumping station; iron post stamped "222" .....	222. 347
Lake View, in front of station; top of rail .....	222. 8
Walls, 132 feet north of station, 156 feet east of track, at southwest corner of store of R. Bozeman; iron post stamped "215" .....	215. 352
Walls, in front of station; top of rail .....	213. 7
Glover, at southeast corner of store of W. C. Knight, 63 feet west of track; iron post stamped "211" .....	211. 628
Glover, in front of station; top of rail .....	212. 6
Lake Cormorant, 458 feet northeast of Yazoo & Mississippi Valley Railroad station, at northwest corner of store of W. W. Blythe, 168 feet east of track; iron post stamped "Prim. Trav. Sta. No. 24, 207" .....	206. 906
Lake Cormorant, in front of station; top of rail .....	208. 0
Marionette, 39 feet southwest of station platform, 45 feet west of track; iron post stamped "Prim. Trav. Sta. No. 25, 202" .....	201. 788
Marionette, in front of station; top of rail .....	203. 2
Marionette, 1.5 miles south of, at milepost "J. 206-M. 24," 75 feet to right of track; concrete slab .....	199. 412
Banks, in front of station; top of rail .....	200. 3
Banks, 200 feet south of station, 18 feet east of track, 36 feet north of crossing; iron post stamped "Prim. Trav. Sta. No. 26, 199" .....	199. 391
Lost Lake, in front of station; top of rail .....	199. 7
Lost Lake, 106 feet west of track, 192 feet southwest of station platform; iron post stamped "Prim. Trav. Sta. No. 27, 195" .....	195. 484
Dragg, 57 feet west of track, 75 feet southwest of station sign "Dragg"; iron post stamped "Prim. Trav. Sta. No. 28, 191" .....	190. 895
Prichard, 1.5 miles north of, at milepost "J. 197-M. 33," 70 feet to right of track; concrete post .....	190. 536
Prichard, 240 feet northwest of station, 105 feet west of track; iron post stamped "Prim. Trav. Sta. No. 29, 191" .....	191. 538
Prichard, in front of station; top of rail .....	194. 8
Savage, 0.5 mile north of, at milepost "J. 191-M. 39," 100 feet from center of track; concrete slab .....	186. 154
Savage, 289 feet northwest of station, 127 feet west of track, at southeast corner of store; iron post stamped "Prim. Trav. Sta. No. 30, 187" .....	186. 722
Savage, in front of station; top of rail .....	192. 6
Savage, 2.4 miles south of, at milepost "J. 188-M. 42," 100 feet to left of track; concrete monument .....	183. 201
Sarah, 456 feet north of station, 60 feet west of track, at southeast corner of building of R. Brown; iron post stamped "Prim. Trav. Sta. No. 31, 199" .....	198. 955
Sarah, in front of station; top of rail .....	194. 8
Askew, 220 feet northwest of station, 153 feet west of track, 15 feet north of road; iron post stamped "Prim. Trav. Sta. No. 30, 181" .....	181. 682
Askew, in front of station; top of rail .....	185. 7
Crenshaw, 189 feet east of track, 123 feet south of road, at northwest corner of hotel; iron post stamped "Prim. Trav. Sta. No. 33, 187" .....	186. 907
Crenshaw, in church yard, top of concrete monument No. 2 .....	189. 267
Crenshaw, in front of station; top of rail .....	189. 4

## TUTWILER QUADRANGLE.

## CRENSHAW SOUTH ALONG YAZOO &amp; MISSISSIPPI VALLEY RAILROAD TO TUTWILER.

Crenshaw, 2.6 miles south of, 85 feet east of track, 37 feet north of road; iron post stamped "Prim. Trav. Sta. No. 34, 170".....	Feet. 170.052
Sledge, 216 feet east of station, at northwest corner of store owned by J. A. Hanks; iron post stamped "Prim. Trav. Sta. No. 35, 168".....	168.408
Sledge, in front of station; top of rail.....	171.7
Falcon flag station, 3,000 feet north of, at milepost "J. 174-M. 57;" 100 feet to right of track; iron post.....	164.815
Falcon, in front of station; top of rail.....	170.2
Falcon, 15 feet west of track, at south end of station platform; iron post stamped "Prim. Trav. Sta. No. 36, 172".....	171.645
Darling, 2,000 feet north of station, in corner of office yard, at milepost "J. 171-M. 60," 100 feet to left of track; iron post.....	164.114
Darling, 24 feet east of track, at north end of station, beside telegraph pole; iron post stamped "Prim. Trav. Sta. No. 37, 168".....	168.491
Darling, in front of station; top of rail.....	168.7
Stalls, in front of station; top of rail.....	167.5
Hinchcliff, 0.8 mile north of, at milepost "J. 168-M. 63," 100 feet to left of track; iron post.....	163.000
Hinchcliff, 51 feet west of track, 63 feet north of S. S. Johnson's store, at corner of fence; iron post stamped "Prim. Trav. Sta. No. 19-A, 162"....	162.547
Hinchcliff, in front of station; top of rail.....	167.0
Iron drawbridge "L. E. 64-76;" top of rail.....	168.8
Marks, 1.2 miles north of, water tank, at milepost "J. 165-M. 66," 100 feet from center of track; iron post.....	159.984
Marks, 24 feet east of track, at south end of platform; iron post stamped "Prim. Trav. Sta. No. 12-A, 163".....	163.471
Marks, 0.2 mile east of station, in yard of Baptist Church, near Mrs. Green's residence, stone (probably concrete monument No. 3).....	164.889
Marks, in front of station; top of rail.....	164.7
Marks, 1.6 miles south of, at milepost "J. 162-M. 69," 70 feet to left of track, near fence; iron post.....	160.850
Lambert, in front of station; top of rail.....	161.9
Lambert, 105 feet east of track, 35 feet north of road, at fence corner of hotel yard; iron post stamped "Prim. Trav. Sta. No. 11-A, 160".....	159.806
Buford Lake, 313 feet south of switch stand, at north end of platform; iron post stamped "Prim. Trav. Sta. No. 13-A, 160".....	160.247
Lambert, 3.8 miles south of, at milepost "J. 156-M. 75," 60 feet to left of center of track; iron post.....	152.763
Alfrey, in front of station; top of rail.....	157.4
Longstreet, 56 feet east of track, at corner of store, 75 feet southeast of bridge "L. E. 77-91;" iron post stamped "Prim. Trav. Sta. No. 14-A, 153"....	152.893
Longstreet, in front of station; top of rail.....	156.8
Vance, in front of station; top of rail.....	157.6
Vance, 33 feet east of track, at south end of station; iron post stamped "Prim. Trav. Sta. No. 15-A, 155".....	155.304
Vance, 90 feet north of milepost "J. 150-M. 81," 150 feet to right of track, between store of Ross & Lowshe and old drug store; iron post.....	155.496
Vance, 3 miles south of, 10 feet north of road, 42 feet west of crossing; iron post stamped "Prim. Trav. Sta. No. 16-A, 157".....	156.681
Tutwiler, 3 miles north of, at milepost "J. 147-M. 84," 50 feet to left of track; iron post.....	156.554

Tutwiler, 75 feet north of track, 120 feet northeast of northeast corner of station, at corner of store; iron post stamped "Prim. Trav. Sta. No. 17-A, 155".....	Feet. 154.726
Tutwiler, in front of station; top of rail.....	157.9

## PRIMARY LEVELING.

Clarksdale, Greenwood, Helena, Tunica, and Tutwiler quadrangles (including, though list is not so subdivided, Alligator, Banks, Belen, Chapeltown, Charleston, Clarksdale, Coahoma, Commerce, Crenshaw, Dublin, Dundee, Friar Point, Glendora, Greenwood, Helena, Hollywood, Jonestown, Lake Cormorant, Lambert, Locopolis, Lula, Money, Moon Lake, Oxberry, Paynes, Philipp, Prichard, Renalare, Robinsonville, Rome, Sabino, Sherard, Sledge, Swan Lake, Tibbs, Tocowa, Tunica, Tutwiler, and Walnut 7½' quadrangles).

## BOLIVAR, COAHOMA, DE SOTO, LEFLORE, QUITMAN, TALLAHATCHIE, TATE, AND TUNICA COUNTIES.

The elevations in the following lists were determined by primary leveling extended from the precise level lines of the Mississippi River Commission along the Mississippi River and from Friar Point to Clarksdale, and from that of the Geological Survey, Memphis, to Tutwiler.

The leveling was done in the Clarksdale 30' quadrangle in 1907 by J. E. McCorkle, jr., and John Dabney, and in 1908 by W. H. Gray, L. W. Mashburn, and N. S. Rorison; in the Greenwood 30' quadrangle in 1908 by Mashburn; in the Helena 30' quadrangle in 1908 by Gray; in the Tunica 30' quadrangle in 1908 by W. E. Brown, G. H. McCoy, C. C. Gardner, Rorison, and Gray; and in the Tutwiler 30' quadrangle in 1907 by McCorkle, and in 1908 by Gray, Mashburn, W. H. Monahan, and Rorison. The leveling done by Mashburn was under the direction of A. L. Dabney, assistant chief engineer, Tallahatchie Drainage Commission.

## TUNICA QUADRANGLE.

## LAKE CORMORANT WEST TO LEVEE, THENCE ALONG LEVEE NORTH AND EAST TO LAKE VIEW.

Section 11-12, on levee, 60 feet east of road, between two wooden posts; iron post.....	Feet. 205.912
Section 10-11 on levee, 100 feet east of road; iron post.....	205.689
Norfolk, 0.4 mile south of Baptist Church, at center of crossroads; iron post stamped "Prim. Trav. Sta. No. 56".....	208.808
Section 8-9 on levee; iron post.....	210.264
Section 6-7 on levee; iron post.....	207.171
Section 5-6 on levee; iron post.....	207.020
Section 4-5 on levee; iron post.....	210.698
Section 3-4 on levee; iron post.....	212.186
Section 2-3 on levee; iron post.....	209.064
Lake View, 159 feet west of center of track, 15 feet northeast of pump station; iron post stamped "222".....	222.368

## POINT NEAR LAKE CORMORANT SOUTHWEST ALONG LEVEE TO CLACK.

Lake Cormorant, 1 mile west of, north edge of road, 60 feet east of gate, 100 feet south of one-room house; nail in root of large oak tree painted "202.547".....	202.74
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Lake Cormorant, 1.5 miles west of, 40 feet southeast of crossroads, 140 feet west of New Liberty Church, in line of wire fence, south of road; iron post marked "Mississippi River Commission, 1906".....	Feet. 204. 525
Lake Cormorant, 2.9 miles southwest of, 0.5 mile east of Star Landing, 250 feet east of section stone "15-16;" Mississippi levee iron post.....	206. 423
Lake Cormorant, 3.8 miles southwest of, on east edge of levee road, in southeast angle of road fork leading east to Holliway's gin; iron post stamped "206".....	206. 082
Lake Cormorant, 3.9 miles southwest of, opposite section stone "16-17;" Mississippi levee iron post painted "205.44".....	205. 730
Clack, 2.4 miles north of, 70 feet east of road, 20 feet east on line with fence, 200 feet east of section stone "17-18;" Mississippi levee iron post stamped "202".....	202. 214
Clack, 1.3 miles north of, 150 feet east of section stone "18-19 C;" Mississippi levee iron post stamped "200".....	200. 688
Clack, 0.4 mile west of, 40 feet east of fork of road to north, on south edge of road leading east to Clack, opposite section post "19-20;" Mississippi levee iron post stamped "204".....	204. 854
Clack, in northwest angle of road fork on east side of Yazoo & Mississippi Valley Railroad track; iron post stamped "Prim. Trav. Sta. No. 15-206".....	206. 093

## CLACK SOUTHWEST TOWARD COMMERCE.

Clack, 1.4 miles southwest of, 150 feet east of section stone "20-21;" Mississippi levee iron post stamped "203".....	203. 080
Clack, 2.3 miles southwest of, 140 feet east of section stone "21-22," 40 feet south of road leading to Robinsonville from Robert Jefferson's house; Mississippi levee iron post stamped "201".....	200. 917
Commerce, 2.6 miles north of, 70 feet east of road, 130 feet west of Antney Massey's house, 600 feet north of section stone "22-23;" iron post stamped "202".....	202. 625
Commerce, 2.5 miles north of, 120 feet east of section stone "22-23;" Mississippi levee iron post stamped "201".....	201. 187

## CLACK NORTHEAST ALONG YAZOO &amp; MISSISSIPPI VALLEY RAILROAD TO LAKE CORMORANT.

Penton, 130 feet south of, 80 feet south of corner of store, 2 feet north of northeast corner of fence; iron post stamped "Prim. Trav. Sta. No. 16, 205".....	205. 197
Lake Cormorant, 30 feet east of restaurant, 450 feet northeast of station, 1 foot north of northeast corner of F. T. Withers & Co.'s store; iron post stamped "Prim. Trav. Sta. No. 24, 207".....	206. 906

## LAKE CORMORANT WEST 0.22 MILE TO CHURCH (DOUBLE-SPUR LINE.)

Lake Cormorant, 0.2 mile west of, 60 feet southwest of southwest corner of church, 30 feet north of fork of road, 200 feet northeast of Mr. Jeffrey's house, in concrete monument; aluminum tablet stamped "208;" stamped in concrete "Miss. 1908 U. S. G. S. No. 1".....	208. 156
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## LAKE CORMORANT EAST TO THE HILLS (SINGLE-SPUR LINE.)

Lake Cormorant, 3 miles east of, south of road; nail in gum tree.....	211. 38
Lake Cormorant, 4.2 miles east of, at forks of road; nail in white oak tree....	301. 12
Lake Cormorant, 5.7 miles east of, 10 feet south of road, in pasture; iron post.....	219. 086

## POINT 1.2 MILES EAST OF LAKE CORMORANT, SOUTH, THENCE WEST TO BANKS.

Lake Cormorant, 1.2 miles east of, on north side of road, 800 feet west of crossroads, in root of large elm tree; nail painted "209.75".....	Feet. 209.941
Lake Cormorant, 2.2 miles southeast of, in northwest angle of T road leading west to Wilson's; iron post stamped "Prim. Trav. Sta. No. 67, 203".....	203.531
Lake Cormorant, 3.3 miles southeast of, 10 feet west of road, 100 feet northeast of northeast corner of double house, in root of 24-inch sycamore tree; nail painted "209.1".....	209.28
Lake Cormorant, 3.9 miles southeast of, on south edge of road, 40 feet west of fork of second-class road leading east, at top of ridge, in root of 12-inch hickory tree; nail painted "291.47".....	291.64
Lake Cormorant, 4.9 miles southeast of, on east edge of road, 725 feet south of house, 40 feet north of second-class road south, in root of peach tree; nail painted "315.8".....	315.96
Lake Cormorant, 5.2 miles southeast of, 15 feet east of road, 50 feet southwest of small lake, 300 feet north of Tiny Perry's house; iron post stamped "312".....	312.649
Lake Cormorant, 6.6 miles southeast of, at intersection of main road to Banks, in root of hickory tree; nail painted "305.96".....	306.10
Banks, 4.8 miles northeast of, on west edge of road, 40 feet north of road forks south to Commerce road, in root of large oak tree; nail painted "311.6".....	311.74
Banks, 3.2 miles east of, on west side of road, 25 feet south of south end of bridge over Whites Creek, 4 feet north of beech tree; iron post stamped "213".....	212.967
Banks, 2.4 miles east of, on east edge of road, 50 feet south of bridge over branch, 0.6 mile west of Commerce road, in root of black gum tree; nail painted "215.88".....	216.00

## TUNICA NORTH AND NORTHEAST ALONG YAZOO &amp; MISSISSIPPI VALLEY RAILROAD TO POINT NEAR ROBINSONVILLE.

Tunica, 385 feet south of station, 30 feet north of crossing; iron post stamped "Prim. Trav. Sta. No. 9, 196".....	195.647
Tunica, in front of station; top of rail.....	197.3

## COMMERCE EAST TO POINT NEAR ROBINSONVILLE.

Commerce, on north edge of road, 175 feet east of forks of road at levee, 340 feet southwest of Abby's store, nail in root of thorn locust tree; painted "202.49".....	202.88
Commerce, 1 mile east of, in northwest angle of road forks, 1,000 feet east of Mount Olive Church; iron post stamped "Prim. Trav. Sta. No. 57, 197".....	197.737
Commerce, 2.9 miles east of, at southwest corner of schoolhouse, 140 feet east of St. Peter's Church, at crossroads; iron post stamped "197".....	197.799

## POINT NEAR COMMERCE SOUTH ALONG LEVEE ROAD TO JOHNSON'S STORE, THENCE SOUTHEAST TO POINT 3 MILES NORTH OF TUNICA.

Commerce, 2 miles southwest of, 45 feet east of intersection of Commerce road with road leading south to Tunica, in root of large cottonwood tree; nail painted "196.98".....	197.38
Commerce, 3.5 miles southwest of, 70 feet west of public highway, in berm of levee; iron post stamped "Prim. Trav. Sta. No. 58, 202".....	201.971
Commerce, 6.8 miles southwest of, 0.7 mile east of Johnson's store, 30 feet south of road, 60 feet west of crossroads, 70 feet north of northwest corner of Mount Nebo Church, in root of large sweet gum tree; nail painted "189, 21".....	189.66

Tunica, 3 miles north of, 50 feet southeast of railroad crossing, immediately opposite section "L"-5, Memphis milepost 36, 570 feet north of; iron post stamped "Prim. Trav. Sta. No. 11, 197" .....	Feet. 197.312
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## JOHNSON'S STORE SOUTH ALONG LEVEE TO MANGUM BROS.' STORE, THENCE EAST TO TUNICA.

Johnson's store, 225 feet east of, at northeast corner of fence on south side of road; iron post stamped "Prim. Trav. Sta. No. 59, 198" .....	198.643
Johnson's store, 0.6 mile south of, 300 feet east of section post "32-33"; Mississippi Levee iron post stamped "195" .....	195.142
Johnson's store, 1.6 miles south of, 250 feet east of section post "33-34;" Mississippi Levee iron post stamped "195" .....	195.338
Mhoon's Landing, 0.3 mile east of, 150 feet east of section post "34-35;" Mississippi Levee iron post stamped "193" .....	193.504
Mhoon's Landing, 1.3 miles south of, 400 feet east of section post "35-36;" Mississippi Levee iron post stamped "188" .....	188.742
Mhoon's Landing, 1.7 miles south of, 40 feet east of levee, 300 feet northwest of northwest corner of Hill's gin; iron post stamped "Prim. Trav. Sta. No. 60, 198" .....	198.105
Mhoon's Landing, 2.4 miles south of, 100 feet east of section post "36-37;" Mississippi Levee iron post stamped "195" .....	195.440
Mangum Bros.' store, 2.8 miles north of, 200 feet east of section post "37-38;" Mississippi Levee iron post stamped "192" .....	192.369
Mangum Bros.' store, 1.8 miles north of, 125 feet east of section post "38-39;" Mississippi Levee iron post stamped "195" .....	195.409
Tunica, 1.7 miles west of, north of road, 2 feet west of southeast corner of fence around Z. T. White's residence; iron post stamped "198" .....	198.131
Tunica, 400 feet south of Yazoo & Mississippi Valley Railroad station, east of railroad; iron post stamped "Prim. Trav. Sta. No. 9, 196" .....	195.647

## POINT 1 MILE NORTH OF HOLLYWOOD NORTH TO LEVEE.

Hollywood, 4 miles north of, 10 feet northeast of forks of road leading north, in root of pecan tree; spike marked "194.94" .....	194.70
Hollywood, 5 miles north of, 5 feet north of road, 300 feet west of vacant house, in base of oak tree; spike marked "191.68" .....	194.42

## HOLLYWOOD EAST 2 MILES.

Hollywood, 75 feet east of station, in line with west wall of brick store; iron post stamped "Prim. Trav. Sta. No. 12" .....	197.324
Agricultural Department bench mark (not described) .....	197.912

## HOLLYWOOD SOUTH 3 MILES, THENCE WEST TO TUNICA.

Hollywood, 2.6 miles east of, west of road, near gate, in walnut tree; spike ..	192.74
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## POINT 2 MILES EAST OF TUNICA SOUTH TO GURLACH ROAD.

Tunica, 2 miles east of, in northwest corner of J. W. Mixon's yard, on Tunica and Gurlach road; iron post stamped "189" .....	189.350
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## POINT 2 MILES NORTHEAST OF HOLLYWOOD NORTHEAST ALONG YAZOO &amp; MISSISSIPPI VALLEY RAILROAD TO CLACK.

Bowdre, 2 feet south of southwest corner of little store, 300 feet northeast of Mr. Wagner's house, 20 feet north of dirt road, 50 feet east of freight house; iron post stamped "Prim. Trav. Sta. No. 13, 201" .....	200.571
Robinsonville, 40 feet north of water tank, 40 feet west of track, 3 feet east of southeast corner of Mrs. Kennedy's yard fence; iron post stamped "201" .....	200.490

# MISSISSIPPI.

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## ROBINSONVILLE EAST TO BANKS.

	Feet.
Lost Lake bridge, 200 feet west of, at T road; iron post.....	194. 597
Banks, 201 feet south of station, 18 feet east of track; iron post stamped "Prim. Trav. Sta. No. 26, 199".....	199. 412

## ROBINSONVILLE WEST TOWARD COMMERCE.

Robinsonville, 1.6 miles west of, in white oak tree; nail.....	199. 88
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## POINT 1.5 MILES EAST OF ROBINSONVILLE SOUTH AND WEST TO POINT 1.5 MILES NORTH OF HOLLYWOOD.

Hollywood, 4 miles northeast of, 100 feet southwest of negro cabin, 50 feet west of bayou, in northeast corner of old store owned by Dr. L. L. Minor; iron post stamped "196".....	195. 813
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## POINT NEAR PRICHARD NORTH AND WEST TO HOLLYWOOD.

Tunica-Hollywood-Prichard road forks, 200 feet east of, in root of oak tree; spike.....	194. 60
House, 100 feet west of, near forks of road leading west, in root of 30-inch oak tree; spike.....	194. 14
Prichard, 1.2 miles west of, north of public road 50 feet, 120 feet west of long bridge over slough, 1 foot west of southwest corner of church; iron post.....	194. 631

## POINT 2 MILES WEST OF PRICHARD SOUTH AND WEST TO POINT 2 MILES SOUTHEAST OF TUNICA.

Prichard, 2 miles west of, in northwest corner of field, 15 feet south of east fork of road leading south, 30 feet south of Tunica and Prichard main road running east-west; iron post stamped "194".....	193. 756
Prichard, 4.2 miles west of, on west side of trail, in oak tree; spike.....	185. 44
Prichard, 5.2 miles west of, north side of old road to Tunica, in root of large oak tree; spike.....	186. 82
Tunica, about 2 miles east of, on Tunica and Gurlach road, in northwest corner of J. W. Mixon's yard; iron post stamped "189".....	189. 350

## BANKS EAST 2 MILES, THENCE SOUTH 2 MILES, THENCE NORTHWEST TO BANKS.

Banks, 3.5 miles east of, west bank of road, at top of hill, in root of large oak tree; spike.....	295. 04
Banks, 4 miles east of, in center of crossroads, on the Banks and Cub Lake road, 200 feet north of house on hill; iron post.....	311. 605

## LOST LAKE EAST AND NORTH TO POINT 3 MILES SOUTHEAST OF BANKS.

T. 3 S., R. 9 W., southwest corner sec. 32 (near), about 200 feet northeast of junction of T road to north; iron post.....	212. 921
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## PRICHARD EAST TO FOOT OF HILLS.

Prichard, 15 feet north of trail, at edge of bayou; on hickory tree.....	185. 94
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## POINT 3 MILES NORTHEAST OF SAVAGE NORTHEAST TO PLEASANT HILL CHURCH.

Savage, 3.5 miles northeast of, on west edge of road, 25 feet west of forks of road leading east, in root of large oak tree; spike.....	309. 18
Savage, 5.3 miles northeast of, in center of triangle made by forks of Arkabutla and Bluff roads to Cub Lake; iron post.....	307. 930
Savage, 7.4 miles northeast of, 6 feet north of road, 75 feet east of old field, in root of oak tree; spike.....	282. 38



## HOLLYWOOD SOUTHEAST 3 MILES (DOUBLE SPUR LINE).

Hollywood, 3 miles east of, on Hollywood and Prichard road, 2 feet north of northwest corner of Rainey's schoolhouse; iron post.....	Feet. 192.745
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## PLEASANT HILL CHURCH NORTH TO CUB LAKE.

Savage, 7.9 miles northeast of, on top of hill on Savage and Cub Lake main road, 3 feet west of northwest corner of Pleasant Hill Church; iron post stamped "270".....	270.104
Savage, 10.1 miles northeast of, 25 feet east of crossroads, 200 feet east of house, near section corner, in gum tree; spike.....	279.54
Savage, 12.2 miles northeast of, 5 feet southeast of Pratt's bridge over Cold Water River on Cub Lake and Arkabutla road; iron post.....	199.943
Cub Lake, about 0.2 mile south of, 10 feet east of road, in root of elm tree; spike.....	205.12
Cub Lake, 100 feet southeast of Locky & Emerson's store, in embankment 75 feet southwest of crossroads; iron post stamped "225".....	225.021

## PLEASANT HILL CHURCH SOUTHWEST TO SHEFORD SCHOOL.

Sheford school; iron post stamped "Prim. Trav. Sta. No. 62".....	272.457
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## POINT 2.9 MILES EAST OF EVANSVILLE SOUTHEAST VIA WALNUT LAKE TO WALNUT LAKE SCHOOLHOUSE.

Evansville, 4 miles east of, north edge of road, 75 feet south of negro cabin, in root of oak tree; nail marked "186.2".....	186.00
Evansville, 5.5 miles east of, 300 feet north of house on Gardford farm, 200 feet west of gate entering farm on west side, near section corner, 15 feet east of large oak tree; iron post stamped "186".....	186.283
Evansville, 6.4 miles east of, on west edge of road, in root of tree; nail marked "178.5".....	178.44
Evansville, 8.2 miles east of, on side of Walnut Lake, 700 feet west of old house in vacant field owned by Tucker brothers, in root of large oak tree; nail marked "177.7".....	177.52
Dubbs, 11.6 miles east of, 2 feet northeast of northeast corner of R. C. Tucker's store, 75 feet west of house; iron post stamped "Prim. Trav. Sta. No. 50, 185".....	184.947
Dubbs, 9.6 miles east of, 10 feet south of road, 100 feet north of Walnut Lake, 300 feet east of Walnut Lake schoolhouse, 75 feet northeast of bridge over Walnut Lake, in root of hickory tree; nail marked "180.8".....	180.38

## POINT 2.9 MILES EAST OF DUBBS EAST TO SARAH.

Dubbs, 2.9 miles east of, in northeast corner of G. W. Pruette's yard, 30 feet north of corner of house, 100 feet south of Clear Lake, 30 feet south of road; iron post stamped "181".....	181.050
Dubbs, 3.6 miles east of, 60 feet north of center of road, 140 feet northeast of little white house, 70 feet south of White Oak Bayou, in root of hickory tree; nail marked "178.3".....	177.96
Dubbs, 4.3 miles east of, 60 feet northwest of intersection of road leading north over White Oak Bayou, 125 feet west of vacant house, 100 feet south of bayou, about 0.3 mile west of Pink post office, in root of large post oak tree; nail marked "178.9".....	178.62
Pink, 1 mile east of, 50 feet south of Clear Lake, 80 feet northeast of church, 250 feet east of negro house, in root of oak tree; nail marked "180.73".....	180.38

Pink, 2.2 miles east of, 100 feet east of fork of Clayton and Asken roads, almost in center of triangle, 130 feet east of large wooden bridge over Walnut Lake, 100 feet northeast of northeast corner of C. W. Terry's cotton gin; iron post stamped "181".....	Feet. 181. 162
Pink, 3.1 miles east of, on bank of Walnut Lake, 30 feet west of road, 75 feet northwest of cotton house, in gum tree; nail marked "180.54".....	180. 16
Pink, 5.2 miles east of, 10 feet south of road, 100 feet northeast of Walnut Lake, 200 feet southeast of Walnut Lake schoolhouse, 75 feet northeast of east end of bridge over lake, in root of hickory tree; nail marked "180.80".....	180. 38
Sarah, about 3 miles west of, 0.9 mile east of Mr. Mitchell's house, 150 feet northeast of bridge over bayou, 5 feet south of large red oak tree in woods; iron post stamped "Prim. Trav. Sta. No. 51, 179".....	178. 586
Sarah, 2 miles west of, 500 feet northeast of negro schoolhouse, 10 feet north of road, in root of oak tree; nail marked "179.3".....	178. 90
Sarah, about 0.2 mile west of, on south bank of Cold Water River, 30 feet north of center of road, 100 feet northeast of negro cabin, 10 feet south of water's edge, in root of tree; nail marked "177.8".....	177. 30
Sarah, 400 feet north of station, 1 foot east of southeast corner of Brown's store, 50 feet southwest of railroad crossing, 120 feet east of end of iron bridge over river; iron post stamped "Prim. Trav. Sta. No. 31, 200"....	198. 976

## HALLY EAST TO CRENSHAW.

Dundee, 9.45 miles east of, 50 feet north of bridge over Cold Water River, 800 feet east of Gurlach mill, 100 feet west of old sawmill shed; iron post stamped "Prim. Trav. Sta. No. 46, 177".....	175. 829
Dundee, 13.4 miles east of, in northeast corner of Wesley Williams's yard, 25 feet northeast of house, in northwest corner of Moore & Co.'s farm; iron post stamped "Prim. Trav. Sta. No. 47, 176".....	175. 902
Dundee, 15.2 miles east of, 10 feet north of road, 25 feet east of old vacant house, on section line, in root of oak tree; spike marked "176.472".....	176. 12
Dundee, 16.4 miles east of, 75 feet west of intersection of road leading south, 200 feet west of negro cabin, in northeast corner of E. P. Vanderburg's farm on sec. 2; iron post stamped "Prim. Trav. Sta. No. 48, 177".....	176. 591
Crenshaw, 300 feet southeast of station, 2 feet north of north corner of D. E. Davenport's hotel; iron post stamped "Prim. Trav. Sta. No. 33, 187"...	186. 928

## SAVAGE NORTHEAST 3 MILES.

Savage, 289 feet northwest of station, 127 feet west of track, at southeast corner of store owned by A. P. Poe; iron post stamped "Prim. Trav. Sta. No. 30, 187".....	186. 743
Savage, 2.5 miles northeast of, on west edge of road, 75 feet east of creek, in root of water oak tree; spike marked "180.35".....	180 44

## POINT NEAR DUNDEE NORTHEAST ALONG YAZOO &amp; MISSISSIPPI VALLEY RAILROAD TO TUNICA.

Maud, 80 feet east of station, 2.5 feet north of J. W. Lake & Co.'s store; iron post stamped "Prim. Trav. Sta. No. 5, 188".....	187. 915
Clayton, 4 feet north of mail crane, 40 feet west of station, 200 feet south of water tank; iron post stamped "Prim. Trav. Sta. No. 7, 197".....	196. 816
Evansville, 80 feet east of southeast corner of station, 50 feet southeast of mail crane, 53 feet east of main railroad track; iron post stamped "Prim. Trav. Sta. No. 8, 191".....	190. 991
Evansville, at office of experiment station of Department of Agriculture, in northeast corner of Dr. Dye's yard; iron post stamped "199.010".....	192. 462

## EVANSVILLE WEST TO AUSTIN.

Evansville, 0.9 mile west of, 40 feet south of Evansville and Austin dirt road, 150 feet east of bridge over slough, 300 feet southwest of negro cabin, in root of large oak tree; nail marked "187.5".....	Feet. 187.36
Evansville, 2.1 miles west of, 10 feet south of Tunica and Austin dirt road, 250 feet south of negro cabin, 50 feet south of intersection of road to right, in root of large oak tree; nail marked "192-5".....	192.32
Austin, in southeast corner of courthouse yard, in top of stone post 3 feet long and 5 inches square, copper bolt; stone marked "U. S. X B. M."..	196.862

## AUSTIN NORTH TO MANGUM BROTHERS' STORE.

Mangum Brothers' store, 0.4 mile south of, 175 feet east of section post "40-41"; Mississippi Levee iron post stamped "193".....	193.174
Mangum Brothers' store, 25 feet north of, at south gate post at fork of road leading east; iron post stamped "Prim. Trav. Sta. No. 10, 197".....	197.077

## AUSTIN SOUTHWEST TO O. K., THENCE 3 MILES SOUTH.

Austin, 0.7 mile south of, 25 feet east of levee, on embankment; top of section stone "43-44," marked "202.1".....	201.94
O. K., 1.4 miles south of, 15 feet east of top of levee, 20 feet west of base of levee; point on top of stone post 45-46 marked "201.4".....	201.18
O. K., 2.4 miles south of, 5 feet east of top of levee, 75 feet west of base of levee; top of stone milepost, painted "205.2".....	205.08
O. K., 3 miles south of, in large bend on top of levee, 7 feet southeast of spur levee running west, opposite W. Kyle's farm; iron post stamped "Prim. Trav. Sta. No. 17, 206".....	206.161

## DUNDEE WEST TO TROTTER'S LANDING.

Dundee, 0.1 mile northwest of station, 10 feet east of Alexander's storehouse, 120 feet west of main railroad and crossing; iron post stamped "Prim. Trav. Sta. No. 5, 185".....	185.136
Dundee, 2.3 miles west of, 75 feet southeast of southeast corner of Friendship Church, 600 feet west of negro house, in root of large white oak tree; nail marked "180.9".....	180.78
Dundee, 3.9 miles west of, in center of road, 250 feet west of negro cabin, 800 feet east of church, in root of elm tree; nail marked "184.6".....	184.42

## EVANSVILLE EAST TO WALNUT LAKE.

Evansville, 1.9 miles east of, 50 feet south of crossroads, 95 feet south of southwest corner of New Hope Church, 80 feet west of graveyard, in root of oak tree; nail marked "185.1".....	184.94
Evansville, 2.9 miles east of, on line with section corner, 25 feet east of crossroads, 700 feet south of Rance Williams's house, 600 feet east of Billie Warner's house; iron post stamped "Prim. Trav. Sta. No. 23, 187, 1908".....	187.449

## DUNDEE NORTHEAST VIA DUBBS TO POINT 2.9 MILES EAST OF DUBBS.

Dundee, 0.4 mile east of, 40 feet south of "44" road, on fence line, in root of 12-inch gum tree; nail marked "178.8".....	178.54
Dundee, 2.2 miles east of, 25 feet north of center of "44" road, 150 feet northwest of cabin, in root of large oak tree; nail marked "175.7".....	175.54
Dundee, 3 miles east of, at center of fork of road leading north to Dubbs from "44" road, 100 feet northeast of negro cabin; iron post stamped "Prim. Trav. Sta. No. 44, 179".....	178.355

Dundee, 4.1 miles east of, at center of fork, 100 feet north of double log house, in cotton field, on section line, in root of 24-inch thorn tree; nail marked "180.0" .....	Feet. 179.70
Dundee, 5.1 miles northeast of, 40 feet north of road leading to house, 300 feet east of public road, 10 feet east of fence line in field, in root of 30-inch walnut tree; nail marked "185.02" .....	184.82
Dubbs, 2 feet west of northwest corner of F. W. Cannon's store, 50 feet east of W. C. Channell's store, 200 feet east of section corner; iron post stamped "190" .....	190.141
Dubbs, 1 mile east of, 40 feet northwest of road fork, on road leading north on section line, 150 feet northwest of house, in root of large oak tree; nail marked "183.5" .....	183.26
Dubbs, 1.8 miles east of, 20 feet south of road, 200 feet southwest of house, in root of large oak tree; nail marked "181.8" .....	181.46
Dubbs, 2.2 miles east of, at intersection of lane running south, 150 feet southwest of house, in root of large oak tree; nail marked "181.77" .....	181.52

## DUNDEE EAST TO HALLY.

Dundee, 1.2 miles east of, in Jack Gray's yard, 6 feet west of northwest corner of house, in root of large oak tree; nail marked "184.1" .....	183.96
Dundee, 3.8 miles east of, 6 feet north of road, 5 feet west of cotton field, 0.25 mile north of house, in root of elm tree; nail marked "178.4" .....	178.20
Dundee, 4.8 miles east of, 15 feet east of intersection of roads running south, 30 feet east of gate entering field, in root of walnut tree; nail marked "177.0" .....	176.82
Dundee, 6.3 miles east of, 75 feet west of Two Mile Lake, 36 feet west of gate of Dr. Stewart's plantation, in edge of woods, 300 feet north of negro cabin; iron post stamped "Prim. Trav. Sta. No. 45, 174" .....	173.345

## HELENA QUADRANGLE.

## POINT 3 MILES SOUTH OF O. K. SOUTH TO STATE LEVEE.

O. K., 6.2 miles south of, 85 feet east of top of State Levee, 10 feet west of road fork, 600 feet southwest of negro cabin on Frank Norfleet's farm; iron post stamped "Prim. Trav. Sta. No. 19, 197" .....	196.680
O. K., 7.5 miles south of, 10 feet east of top of levee, 75 feet west of basement, 25 feet south of old settlement road crossing over levee; iron post stamped "202.4" .....	202.326
O. K., 8 miles south of, 25 feet east of top of levee, 35 feet west of basement, 300 feet north of bend in levee; top of stone milepost, marked "199.0" ..	198.82
Trotter's Landing, 3.1 miles north of State Levee; top of stone mile post ..	198.817
State Levee, 1.8 miles north of, 50 feet south of old road across levee, 0.2 mile west of house, in center of angle of levee; iron post stamped "Prim. Trav. Sta. No. 19, 193" .....	192.607
State Levee, 150 feet northwest of Burnett's store, 80 feet east of road, 100 feet north of railroad, nail in root of large oak tree .....	181.94

## TUTWILER QUADRANGLE.

POINT 1.6 MILES SOUTH OF CRENSHAW SOUTHWEST TO TIBBS, THENCE NORTH TO  
EDGE OF QUADRANGLE.

Crenshaw, 1.4 miles west of, 40 feet north of crossroads, in root of oak tree; spike marked "170.76" .....	170.88
Crenshaw, 2.4 miles west of, in line with wire fence, 75 feet west of dirt road leading south, 100 feet southwest of house, in root of oak tree; nail marked "171.90" .....	172.02

Crenshaw, 2.7 miles west of, near section line running east-west, in southwest corner of L. E. Brook's yard, 45 feet southwest of house owned by Will Roseburgh & Co.; iron post stamped "173" .....	Feet. 172. 845
Crenshaw, 3.2 miles west of, 100 feet west of crossroads, 200 feet west of Yellow Lake, in root of hickory tree; spike marked "172.35" .....	172. 48
Crenshaw, 4.4 miles west of, in center of slough, in root of large oak tree; nail marked "166.91" .....	167. 02
Crenshaw, 5.4 miles west of, 75 feet north of wire fence, in root of oak tree; spike marked "172.03" .....	172. 16
Crenshaw, 6 miles west of, 3 feet southeast of southeast corner of house owned by H. W. Martin situated about in center of cotton field (road makes bend around house); iron post stamped "173" .....	173. 375
Crenshaw, 8.4 miles west of, 75 feet southeast of forks of road, 300 feet southwest of bridge over Coldwater River, about 600 feet east of Tibbs post office, in root of gum tree; nail marked "174.09" .....	174. 22
Tibbs mill, 2.7 miles north of, on west bank of Coldwater River, 5 feet north of road, in root of elm tree; spike marked "174.22" .....	174.34

## TIBBS WEST 1.2 MILES.

Tibbs mills, 0.7 mile southwest of, in southeast corner of S. P. Scott's yard, 100 feet southeast of southeast corner of house; iron post stamped "171" .....	171. 205
Tibbs, 1.2 miles southwest of, 3 feet southeast of road, in root of hickory tree 20 inches in diameter; spike marked "172.73" .....	172. 88

## POINT 2.8 MILES WEST OF TIBBS SOUTHWEST ALONG HIGHWAYS TO RICH, THENCE SOUTHEAST ALONG HIGHWAYS TO POINT 1.7 MILES SOUTH OF BIRDIE.

Tibbs, 2.8 miles southwest of, 300 feet west of Sun Rise Bayou, 5 feet east of road, in root of 18-inch hickory tree; spike marked "173.60" .....	173. 78
Tibbs, 4.4 miles southwest of, on bank of Six-mile Lake, 200 feet west of Six-mile Lake, 75 feet west of road, in woods near old field owned by Tibbs & Co.; iron post stamped "172" .....	172. 282
Tibbs, 6.3 miles southwest of, on bank of bayou, 200 feet south of house, in root of large oak tree; spike marked "171.37" .....	171. 60
Rich, 5.3 miles northeast of, in the east corner of Stempson Land Co.'s Hotel yard, 35 feet east of southeast corner of hotel, 350 feet south of old sawmill shed; iron post stamped "172" .....	172. 612
Rich, 3.1 miles northeast of, 3 feet southeast of track, in root of elm tree; spike marked "171.54" .....	171. 80
Rich, 1.9 miles northeast of, 50 feet west of house, 25 feet east of road, in root of 16-inch oak tree; spike marked "175.18" .....	175. 50
Rich, 2 feet west of northwest corner of Scott & Garrott's store; iron post stamped "180" .....	179. 916
Rich, 2.5 miles east of, 200 feet south of house, 150 feet west of Yazoo Pass River, in root of 24-inch oak tree; spike marked "172.96" .....	173. 36
Rich, 3.2 miles east of, 50 feet east of Rich and Birdie dirt road running north-south along bank of Yazoo Pass River, 200 feet east of river, in road near large bend in road; iron post stamped "174" .....	174. 286
Rich, 5.4 miles east of, in southeast corner of Burns Dickerson's house, 200 feet south of Coldwater River, on south bank, 600 feet south of Griffin's store at Birdie; iron post stamped "172" .....	172. 263
Birdie, 1.3 miles south of, on west bank of Coldwater River, 30 feet east of dirt road, 200 feet north of road leading west through lane, root of gum tree; marked "167.27" .....	167. 64
Birdie, 1.8 miles south of, 2 feet north of road, 75 feet south of house, in lane, root of hickory tree; marked "168.22" .....	168. 70

## RICH SOUTH ALONG HIGHWAYS TO MATAGORDA.

	Feet.
Rich, in front of station; top of rail.....	181. 2
Rich, 2.5 miles south of, in northwest corner of E. O. Leach's yard, 600 feet north of his sawmill, 50 feet northwest of house, property owned by the United States Nursery Co.; iron post stamped "176".....	176. 664

## MATAGORDA NORTHEAST ALONG HIGHWAYS TO POINT 1.3 MILES SOUTH OF BIRDIE.

Matagorda, 1.2 miles east of, 40 feet north of road forks leading north, in old vacant field, 300 feet south of house, in root of large oak tree; spike marked "170.74".....	171. 76
Matagorda, 3.3 miles east of, 2 feet north of northwest corner of Macklin's Church, 200 feet south of house, 150 feet south of bridge over bayou, church is 40 feet south of Jonestown and Birdie dirt road; iron post stamped "170".....	170. 211
Matagorda, 5.3 miles east of, 5 feet east of road, in woods near old field, in root of oak tree; spike marked "168.19".....	168. 56

## POINT NEAR COAHOMA SOUTHEAST TO JONESTOWN.

Coahoma, 4.9 miles east of, 0.3 mile north of Mrs. Cohn's former residence, on east side of road, in root of large hickory tree; nail painted "175.3" ..	175. 24
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## COAHOMA NORTH ALONG YAZOO &amp; MISSISSIPPI VALLEY RAILROAD TO POINT NEAR DUNDEE.

Moon, 4.8 miles north of Coahoma, 2 feet south of southwest corner of Carr Bro.'s store; iron post stamped "Prim. Trav. Sta. No. 2, 182".....	181. 945
Lula, bench mark of the Department of Agriculture, office of drainage experiment station; iron post.....	181. 885
Lula, 0.1 mile north of station, at northwest corner of Fraternity Hall; iron post stamped "Prim. Trav. Sta. No. 3, MISS 182".....	181. 840
Lula, 2.4 miles north of, 130 feet north of settlement dirt road crossing, 75 feet west of dirt road forks, 17 feet east of railroad, 3 feet north of mile-post "N. O. 401-M 54;" iron post stamped "Prim. Trav. Sta. No. 4, 186" ..	185. 945

## MARKS WEST 4 MILES TOWARD BELEN.

Marks, 10 feet east of southwest corner of platform of Yazoo & Mississippi Valley Railroad station, 1.5 feet west of telephone pole on south side of station; iron post stamped "Prim. Trav. Sta. No. 10 A".....	163. 492
Marks, 2.4 miles west of, on northwest edge of road, 150 feet west of southwest end of wooden bridge over Cassidy Bayou, in root of large oak tree; nail painted "164.6".....	164. 72
Marks, 3.2 miles west of, south of road, 30 feet southeast of south end of wooden bridge over Cassidy Bayou, 400 feet northeast of northeast corner of Mr. Turner's residence; iron post stamped "Prim. Trav. Sta. No. 9 A, 166" ..	165. 926

## POINT 3.2 MILES WEST OF MARKS NORTHWEST TO POINT 6 MILES NORTHWEST OF MARKS.

Mr. Turner's residence, 2.6 miles north of, in northwest angle formed by lane leading west, 150 feet east of southeast corner of S. H. Pankey's house; iron post stamped "166".....	166. 128
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## MARKS EAST TO BOBO BAYOU.

Marks, 0.5 mile east of, 50 feet northeast of east end of iron bridge over Coldwater River, in root of large oak tree; nail painted "163.8".....	163. 872
Marks, 1.3 miles southeast of, at forks of road leading east to Batesville and south to mouth of Coldwater River, 60 feet west of house, in root of wild cherry tree; nail painted "163.5".....	163. 62

Marks, 6 miles east of, 12 feet north of road, on east bank of Bobo Bayou, Clunet ford, on road from marks east to Batesville; iron post stamped "156".....	Feet. 156. 179
Bobo Bayou, 2.4 miles east of, 8.3 miles east of Marks, 15 feet south of road, 15 feet west of north bank of bayou, 150 feet east of road crossing bayou, in root of sycamore tree; nail painted "161.9".....	161. 96
POINT NEAR MARKS SOUTHEAST VIA COLDWATER RIVER TO BLANK (SINGLE SECONDARY SPUR LINE).	
Marks, 1.3 miles southeast of, at forks of road leading east to Batesville and south to mouth of Coldwater River, in root of wild cherry tree; nail painted "163.5".....	163. 62
Marks, 2.2 miles southeast of, on west edge of road, 170 feet southwest of Tom Cottle's house, 200 feet north of abrupt curve in road, in root of large oak tree; nail painted "161.6".....	161. 70
MARKS NORTH TO POINT NEAR HINCHCLIFF, THENCE NORTHWEST 4 MILES THENCE EAST TO STALLS.	
Marks, 1.2 miles northeast of, on west edge of road, in root of 12-inch sassafras tree; nail painted "161.7".....	161. 76
Marks, 5.3 miles northwest of, 2 miles west of Yazoo & Mississippi Valley Railroad crossing, 350 feet west of road forks, on north edge of road, in root of 20-inch oak tree; nail painted "163.4".....	163. 48
Stalls, 1.4 miles west of, 150 feet from southeast corner of county farm barn, in root of 28-inch black gum tree; nail painted "163.6".....	163. 66
POINT 2.4 MILES WEST OF MARKS SOUTHEAST TO POINT 1.1 MILES SOUTHEAST OF HOLCOMB SAWMILL, THENCE NORTH TO MARKS (SECONDARY CIRCUIT).	
Marks, 2.4 miles west of, on north edge of road, 175 feet east of south end of new bridge over Cassidy Bayou, in root of large oak tree; nail painted "164.6".....	164. 72
Marks-Belen road, 1.3 miles south of, 130 feet northwest of gate at road forks, in root of large oak tree; nail painted "157.3".....	157. 45
Holcomb's sawmill, 0.2 mile south of, in northwest angle of road fork leading south to Lambert, in root of oak tree; nail painted "159.2".....	159. 30
LAMBERT EAST TO COLDWATER RIVER (SINGLE PRIMARY SPUR LINE).	
Lambert, 1 mile south of, in angle formed by Yazoo & Mississippi Valley Railroad and road, in root of Spanish oak tree; nail painted "156.7"....	156. 80
Lambert, 2.7 miles southeast of, 350 feet east of sawmill, at junction of tram road, in root of hickory tree; nail painted "154.6".....	154. 66
JONESTOWN SOUTHWEST TO POINT NEAR CLOVERHILL.	
Jonestown, 50 feet southwest of main street crossing with road leading south to Clarksdale, in northeast corner of J. Richberger's brick store; bronze tablet stamped "175".....	175. 069
Jonestown, 3.4 miles southwest of, 60 feet east of crossroads, in southeast angle formed by crossroads leading north and south from Jonestown and Cloverhill road, in root of pecan tree; nail marked "171.8".....	171. 78
Jonestown, 3.4 miles southwest of, in center of angle formed by fork leading north from crossroads, 0.2 mile west of automatic gate on Jonestown and Cloverhill road, 60 feet east of pecan tree; iron post stamped "172".....	172. 246

## POINT NEAR JONESTOWN EAST 5 MILES, THENCE SOUTH TO BELEN.

Jonestown, 2.3 miles east of, 150 feet north of ford crossing Moore Bayou, in triangle of road forks; iron post stamped "Prim. Trav. Sta. No. 3-A, 170".....	Feet. 169. 977
Jonestown, 5 miles east of, at forks of road running north, 40 feet south of east end of wooden bridge over bayou, in root of oak tree; nail painted "163.9".....	163. 68
Jonestown, 5.5 miles east of, 30 feet west of road, immediately opposite road fork east; iron post stamped "Prim. Trav. Sta. No. 4-A, 166".....	165. 405
Belen, 3.3 miles northwest of, on east side of road, 45 feet northwest of north corner of Jones Chapel Church; iron post stamped "170".....	169. 369
Belen, in northeast pier of entrance on east side of Quitman County courthouse; bronze tablet stamped "172".....	170. 918

## POINT 5 MILES EAST OF JONESTOWN EAST AND SOUTHEAST TO POINT 6 MILES NORTHWEST OF MARKS.

Mr. Turner's residence, 4.6 miles north of, north edge of road, immediately opposite fork, in root of ash tree; nail painted "163.6".....	163. 34
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## BELEN EAST TO CASSIDY BAYOU.

Belen, 1.1 miles east of, 25 feet north of road, 30 feet south of Cassidy Bayou, at road crossing, in root of oak tree; nail painted "154.6".....	154. 74
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## BELEN SOUTH 2 MILES, THENCE SOUTHWEST TO DEBORAH.

Belen, 3.8 miles southwest of, 1,500 feet southwest of Massidonia Church, on south edge of road leading south to Sabino, from Belen and Lyon road; iron post stamped "Prim. Trav. Sta. No. 5-A, 164".....	163. 432
Belen, 6.6 miles southwest of, 20 feet west of road, immediately opposite road fork east, 125 feet north of G. W. Price's store; iron post.....	165. 084
Lyon, 6.9 miles east of, at west end of Webb's store house, 5 feet south of northwest corner of store on east side of Belen and Lyon road; iron post stamped "167".....	167. 115

## POINT 3.8 MILES SOUTHWEST OF BELEN SOUTH VIA SABINO TO MUD SCHOOLHOUSE, THENCE WEST TO BIG CREEK.

Belen, 6.9 miles southwest of, on east side of road, 235 feet south of white gate, 100 feet east of little new house, in root of oak tree; nail painted "164.2".....	164. 02
Sabino, in west angle of road forks, at corner of fence, 130 feet southeast of Dr. Scott's store; iron post stamped "Prim. Trav. Sta. No. 6-A, 168"...	167. 940
Sabino, 3.2 miles southwest of, at southeast corner of Mud bridge over Cassidy Bayou, in northwest angle of road fork leading southwest to Bellview, 375 feet southwest of Mud schoolhouse, 110 feet northwest of Mack Christman's house; iron post stamped "160".....	160. 173
Sabino, 4.6 miles southwest of, 1.3 miles northwest of Mud bridge over Cassidy Bayou, 350 feet west of A. Fowler's sawmill, on west side of road, on east bank of Big Creek, in root of gum tree; nail painted "U. S. 164.2"...	164. 06
Sabino, 5.4 miles southwest of, 0.8 mile southwest of A. Fowler's sawmill, on north edge of road, 500 feet west of road fork, 15 feet south of southwest corner of old house, in root of large tree; nail painted "165.3".....	165. 14
Sabino, 6.6 miles southwest of, 2 miles west of A. Fowler's sawmill, on north edge of road, immediately opposite fork leading west to three houses, 1.5 feet east of mail box No. 72; iron post stamped "166".....	166. 75



Sabino, 7.7 miles southwest of, 3.1 miles west of A. Fowler's sawmill, on east side of road, 250 feet south of McGuire's Chapel Church, in root of large oak tree; nail painted "163.8".....	Fest. 163. 12
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## MUD SCHOOLHOUSE EAST TO OLD ANTLERS POST OFFICE. (PART OF LINE TO BUFORD LAKE.)

Mud schoolhouse, 375 feet southwest of, 110 feet northwest of Mack Christman's house, at southeast corner of east end of bridge over Cassidy Bayou, in west angle of road leading southwest to Bellview; iron post stamped "160".....	160. 173
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Mud schoolhouse, 2.6 miles east of, in northwest angle of road forks known as "J. J. Dickey and M. D. Baisclair forks," 4 feet east of oak tree; iron post stamped "162".....	161. 822
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Antlers, old post office, north edge of road, opposite road fork leading to Clarksdale, in corner of fence, 4 feet west of 12-inch gate post, 140 feet northeast of northeast corner of J. J. Dickey's residence; iron post stamped "159".....	158. 957
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## BIG CREEK FROM SEC. 21 SOUTHEAST TO SEC. 36, T. 27 N., R. 3 W.

T. 27 N., R. 3 W., in SW. $\frac{1}{4}$ sec. 22, in front of gin near bank of Big Creek, in south root of 24-inch white oak tree; 20-penny nail.....	161. 38
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## BIG CREEK AT SEC. 36, T. 27 N., R. 3 W., SOUTH 1 MILE AND SOUTHWEST TO MELANCHOLY BAYOU.

Boxelder, at southwest corner of SE. $\frac{1}{4}$ sec. 36, T. 27 N., R. 3 W.; iron post stamped "165".....	165. 223
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T. 26 N., R. 3 W., on section line between secs. 1 and 13, 25 feet east of south gate of Dave Baxley's place, south of gin, in west root of 24-inch hickory tree; 20-penny nail.....	163. 70
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T. 26 N., R. 3 W., in NE. $\frac{1}{4}$ sec. 15, 30 feet northwest of north end of bridge over Hopson's Bayou, in south root of hackberry tree; 20-penny nail.....	160. 56
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## ANTLERS OLD POST OFFICE SOUTHEAST TO BUFORD LAKE.

Buford Lake, 0.9 mile northwest of, on south edge of road, 60 feet west of south end of wooden bridge over Buford Lake, at fork of road leading north to Lambert, in root of oak tree; nail painted "156.3".....	156. 08
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Buford Lake, 5 feet east of railway track, 1.5 feet north of platform of Yazoo & Mississippi Valley Railroad; iron post stamped "Prim. Trav. Sta. No. 13-A 160".....	160. 268
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## MATTSON SOUTHEAST ALONG YAZOO &amp; MISSISSIPPI VALLEY RAILROAD TO TUTWILER (ADJUSTED MEAN OF TWO LINES). ELEVATIONS DETERMINED FROM LEVELING BY L. W. MASHBURN, TALLAHATCHIE COMMISSION.

Dublin, 2,000 feet south of, at milepost "J. 144-M. 87," 60 feet to right of center of track; iron post.....	156. 994
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Tutwiler, 1.8 miles northwest of, at milepost "J. 141-M. 90," 40 feet to left of center of track; iron post.....	157. 582
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## TUTWILER SOUTH ALONG YAZOO &amp; MISSISSIPPI VALLEY RAILROAD, 1.2 MILES (PART OF DOUBLE LINE TO GREENWOOD, ESTABLISHED BY L. W. MASHBURN, TALLAHATCHIE COMMISSION).

Tutwiler, 1.2 miles south of, at milepost "J. 138-M. 93," 60 feet to right of track; iron post.....	148. 082
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## CREVI NORTH TO PORTER'S FERRY.

Yocona Bottom, gate of, 1,000 feet north of, on 18-inch hickory tree; bench mark No. 19.....	172. 07
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Crevi, 3 miles north of, at south end of bridge over Yocona River, 179.22 feet above zero of gage; iron post .....	Feet. 180.710
Crevi, near, 1 mile west of W. P. Murphy's house, in fence, 30 feet east of Wallis's bench mark H. 42; on root of tree; bench mark No. 24.....	181.63
Crevi, near, Wallis's bench mark H. 42 .....	180.27
Tocowa, 2 miles south of, about 1,200 feet northwest of negro house on hill, 250 feet north of big sycamore tree, west of road, on 8-inch elm tree; bench mark No. 26.....	176.89
Tocowa, 2.5 miles north of, about 1,200 feet south of old log house, on right of road, on west of valley road; on 24-inch red oak tree; bench mark No. 30.	201.57
Tocowa, 3 miles north of, 20 feet to east of valley road, 300 feet south of "W. 117 B. M.," on black gum tree; bench mark 31.....	199.58
Caldwell's store, 0.5 mile south of, 10 feet west of small bridge, west of road; iron post.....	202.623
Caldwell's store, 50 feet northwest of, at crossroads, on big gum tree; bench mark No. 33.....	186.95
Caldwell's store, 1.5 miles northeast of, on old road, 300 feet south of big washout, on 18-inch white oak tree; bench mark No. 35.....	177.50
Porter's Ferry, 600 feet east of, south of river, on 24-inch red oak tree; bench mark No. 37.....	179.66

## CHARLESTON NORTH TO CREVI.

Charleston, on west side of Yazoo & Mississippi Valley Railroad, at corner of small restaurant; iron post.....	179.366
Charleston, about 3.25 miles north of, about 1,000 feet north of stream, east of road; on root of large red oak tree; bench mark 5.....	208.21
Charleston, about 4.5 miles north of, about 0.5 mile north of Mr. Cord's house, east of road, about 100 feet south of steep hill and small branch at bottom, on big red oak tree; bench mark 7.....	210.36
Charleston, about 6 miles north of, west of road, 30 feet north of stream crossing, 350 feet southwest of dwelling, east of road; iron post stamped..	196.45
Charleston, north of, on Joseph Thornton's place, about 1,000 feet north of big gully running across road, east of road, on big red oak tree; bench mark 10.....	190.07
Charleston, 9 miles north of, about 1.5 miles south of Crevi, 1,000 feet north of Bunlyn, on 12-inch sycamore tree; bench mark No. 14.....	183.15

## CLARKSDALE QUADRANGLE.

## CLARKSDALE NORTH ALONG YAZOO &amp; MISSISSIPPI VALLEY RAILROAD TO RUDYARD.

Clarksdale, at upstream end of bridge in line of northeast face of pedestal block and 0.1 meter from north corner of pedestal, on stone cap block of northeast pier (Clarksdale side) of Yazoo & Mississippi Valley Railroad bridge over Sunflower River; chiseled cross marked "U. S. + P. B. M.".....	172.930
Deborah, 290 feet north of wooden bridge across Big Creek (Cassidy Bayou), 340 feet north of Leeton's gin, at southeast corner of C. W. Leeton's storehouse; iron post stamped "160".....	160.355
Lyon, 400 meters south of station, 200 meters west of Yazoo & Mississippi Valley Railroad track, in line with north wall of church and 2 meters east of east wall, near northeast corner of "Old" Baptist Church; iron post (pipe in bad order, bent and very loose in ground).....	173.950
Cloverhill, 15 kilometers north of station on Yazoo & Mississippi Valley Railroad main line, at southwest corner of yard of railway section house; top of pipe (post in bad order, loose in ground).....	173.416

T. 26 N., R. 3 W., near southwest corner of SE. $\frac{1}{4}$ sec. 7, 5 feet south of southwest corner of St. Paul Church; iron post stamped "163".....	Feet. 163. 317
T. 26 N., R. 4 W., at intersection of section line between secs. 13 and 24 and Sunflower River, about 0.5 mile north of Schyder's Ditch, on west side of road, in north root of blazed gum tree 36 inches in diameter; nail...	163. 14
T. 26 N., R. 4 W., just north of southwest corner of sec. 25, on east bank of Sunflower River, in east root of 24-inch pecan tree; 20-penny nail.....	161. 44

## LINE TO BOBO ON YAZOO &amp; MISSISSIPPI VALLEY RAILROAD.

T. 26 N., R. 4 W., in NW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 36, 180 feet south of corner where road makes a right angle, in east root of 36-inch elm tree; 20-penny nail..	159. 82
T. 25 N., R. 3 W., near southwest corner of NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 6, at mouth of lane 350 feet south of house, 1 mile east of Traynham, on southwest part of Eggleston's plantation, in corner of fence on north side of lane; iron post stamped "156".....	156. 276
Oliver post office, near southeast and southwest quarter line in sec. 3, T. 25 N., R. 4 W., on north bank of Sunflower River, in northeast corner of yard, 50 feet northeast of E. L. Johnson's; iron post stamped "158"...	158. 437
T. 25 N., R. 4 W., SW. $\frac{1}{4}$ sec. 9, near house where road for Roundaway leaves river road a short distance north of Shapley's Ford, in east root of white oak tree; 20-penny nail.....	155. 90
T. 25 N., R. 4 W., at corner secs. 7, 8, 17, and 18; iron post stamped "154"...	154. 248

## MOUTH OF HARRIS BAYOU WEST AND NORTHWEST TO BOBO.

T. 26 N., R. 4 W., NW. $\frac{1}{4}$ sec. 35, corner of Mr. Johnson's yard, south of where Harris Bayou empties into Sunflower River, in 12-inch catalpa tree; 20-penny nail.....	160. 32
T. 26 N., R. 4 W., NW. $\frac{1}{4}$ sec. 35, 300 feet south of the mouth of Harris Bayou, in northeast corner of yard to Mr. Johnson's house; iron post stamped "161".....	161. 016
T. 26 N., R. 4 W., SE. $\frac{1}{4}$ of sec. 33, about 0.5 mile west of gate, on south bank of Harris Bayou, 250 feet west of section line, in southwest root of 30-inch white oak tree; 20-penny nail.....	158. 74
T. 26 N., R. 4 W., about 225 feet west of southeast corner of sec. 32, in north root of 48-inch white oak tree; 20-penny nail.....	158. 48
T. 26 N., R. 4 W., about 50 feet northwest of southeast corner of sec. 31; iron post stamped "157".....	156. 169
T. 26 N., R. 4 W., on section line between secs. 31 and 32, 550 feet from south end of bridge, just south of Harris Bayou, on east side of road, southwest of double house, in east root of pecan tree; 20-penny nail....	158. 06
T. 26 N., R. 4 W., at corner secs. 19, 20, 29, and 30, about 1,250 feet north of Styran's sawmill; iron post stamped "154".....	154. 059
Government farm, in first tenant yard north of bridge over Harris Bayou, in northwest root of 18-inch sweet gum tree; 20-penny nail.....	161. 40

## ST. PAUL CHURCH WEST TO PULLEN.

St. Paul Church, 10 feet southeast of southeast corner of, 300 feet north of forks of public road; iron post stamped "163".....	163. 317
St. Paul Church, 0.7 mile west of, 75 feet south of road forks, in root of elm tree; nail.....	160. 66
St. Paul Church, 1 mile west of, 50 feet west of forks of road, in root of elm tree; spike.....	160. 26
St. Paul Church, 3.2 miles west of, 30 feet west of northwest corner of Sunny-side schoolhouse, in root of large oak tree; nail.....	156. 72

St. Paul Church, 7 miles west of, 2 feet south of road, 300 feet west of gate to field, 400 feet west of negro house, in woods in root of large oak tree stump; spike.....	Feet. 160. 25
Pullen, 75 feet west of railroad, in yard; iron post stamped "163".....	162. 758

## RUDYARD NORTH TO COAHOMA, THENCE NORTHEAST 0.8 MILE

Rudyard, 20 feet west of railroad, 70 feet north of station, 50 feet southeast of W. W. Miller's store, 30 feet northwest of road crossing; iron post stamped "174".....	174. 812
Coahoma, 10 feet west of 19-inch blazed gum tree, in ground 26 feet south of south wall and in line with east wall of Methodist Church, which is a large frame building standing almost centrally in a triangle formed by the Yazoo & Mississippi Valley tracks; iron post.....	177. 763
Coahoma, in front of station; top of rail.....	182. 1
Coahoma, 2.5 feet from northwest corner of brick hotel; iron post stamped "Prim. Trav. Sta. No. 1, 179, 1908".....	178. 448

## COAHOMA SOUTHEAST 1.3 MILES.

Coahoma, 1.3 miles east of, in southwest angle of fork of second-class road leading south, 700 feet south of large frame house, in root of oak tree; nail painted "180".....	179. 96
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## COAHOMA WEST TO FRIAR POINT, THENCE SOUTH 3 MILES.

Long Lake flag station, 1,100 feet south of fork of main road fork, 300 feet north of negro schoolhouse; iron post stamped "178".....	178. 069
Friar Point, in northeast end of southeast wall of brick building of W. H. Dickerson, block 2, Fuller's addition; copper bolt.....	181. 339
Friar Point, 2.8 miles south of, 40 feet west of road, 500 feet southwest of negro house, 100 feet northwest of cotton house, in root of black gum tree; nail.....	177. 10

## FRIAR POINT NORTHEAST ALONG LEVEE TO STATE LEVEE.

Friar Point, 3.7 miles north of, 100 feet east of levee road, 150 feet east of top of levee, 15 feet east of elm tree, 200 feet west of McKay's farm; iron post stamped "180".....	180. 420
Friar Point, 3.7 miles north of, 10 feet west of levee road, 600 feet northwest of large elm tree; iron post stamped "Prim. Trav. Sta. No. 22".....	187. 646
Friar Point, 6.5 miles north of, 17 feet west of levee road, 75 feet southwest of fork of settlement road east, 50 feet west of top of levee, 0.1 mile west of old vacant store; iron post stamped "188".....	188. 442
Friar Point, 7 miles north of, 0.2 mile west of negro cabin, near center of triangle of levee, 30 feet west of road; iron post stamped "Prim. Trav. Sta. No. 21, 189.2".....	189. 172
Friar Point, 10.5 miles north of, 30 feet west of levee road, 80 feet east of top of levee, 600 feet west of Thompson's store; iron post stamped "Prim. Trav. Sta. No. 20, 191.6".....	191. 556

## POWELL SIDING SOUTHEAST TO MASCOT STATION.

Danforth, 40 feet east of station, 3.3 miles east of State Levee, 48 feet southeast of settlement road, 15 feet east of railroad; iron post stamped "184".....	183. 937
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## BENCH MARK ESTABLISHED BY UNITED STATES ENGINEERS ON PRECISE LEVEL LINE FROM CLARKSBURG.

Temporary bench mark 10—Mattson, about 700 feet from station, 200 feet from track, east of first cattle guard on Lombardy Branch of Yazoo & Mississippi Valley Railroad, in root of 10-inch elm tree 1 foot out from trunk, on edge of small cemetery; nail (elevation 178.87 feet, or 55.4379 meters, Cairo datum).....	162. 126
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BENCH MARK ESTABLISHED BY L. W. MASHBURN—ELEVATION DETERMINED FROM PRECEDING BY DOUBLE LINE.

Mattson, 150 feet south of station, 50 feet left of track, at corner of Jenkin's store; iron post.....	Feet. 163. 252
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GREENWOOD QUADRANGLE.

POINT 4 MILES EAST OF LOCOPOLIS EAST TO CHARLESTON.

2,000 feet west of Shook house, 120 feet east of fence corner, on root of big black gum tree; bench mark No. 11.....	145. 48
Gladys, flag station, 1,000 feet west of milepost "C 5-P 21," on east of railroad, near telephone pole; iron post stamped "Prim. Trav. Sta. No. 36-A".....	147. 402

CHARLESTON SOUTH TO POINT 6 MILES SOUTH OF PAYNES.

Charleston, 0.5 mile south of, about 700 feet south of end of spur running to foot of hill, on east of road, on 24-inch hackberry tree; bench mark No. 1.....	181. 90
Charleston, 1.5 miles south of, 70 feet south of Sta. B. 29, east of road, on big hickory tree; bench mark No. 3.....	191. 88
Charleston, 3.2 miles south of, 300 feet south of house, under hill, in corner of wire fence, 200 feet from road; iron post.....	203. 080
Paynes, 2 feet northeast of northeast corner of store; iron post.....	181. 509
Paynes, 1.2 miles south of, 0.2 mile south of Dr. Demman's, 100 feet south of log house, on root of 18-inch red-oak tree; bench mark No. 10.....	205. 81
Taylor Church, on Leverett plantation, in front of church; on root of small post oak; bench mark No. 13.....	193. 75
Paynes, 6 miles south of, on top of small hill north of Shannon place, on root of big oak tree; bench mark No. 16.....	196. 01

POINT NEAR TUTWILER SOUTHEAST ALONG YAZOO & MISSISSIPPI VALLEY RAILROAD TO WEBB.

Tutwiler, 2.8 miles southeast of, 50 feet south of main track and 200 feet feet south of white house west of track; iron post stamped "Prim. Trav. Sta. No. 30-A".....	150. 574
Sumner, west of track, in fourth lot south of jail; iron post stamped "Prim. Trav. Sta. No. 31-A".....	152. 644
Webb, 20 feet from northeast corner of Yazoo & Mississippi Valley Railroad station; iron post stamped "Prim. Trav. Sta. No. 32-A".....	152. 844
Webb, east end of Main Street, 1,200 feet east of station, in base of large shade water oak; spike.....	149. 661

WEBB SOUTHEAST ALONG YAZOO & MISSISSIPPI VALLEY RAILROAD TO GLENDORA.

Albin, at north corner of Jerry Robinson's store; iron post stamped "Prim. Trav. Sta. No. 50-A".....	150. 093
Swan Lake, at southeast corner of W. E. Hawkin's store, on west side of railroad and opposite station, iron post stamped "Prim. Trav. Sta. No. 49-A, 1908 MISS. 148".....	148. 600
Whitehead flag station, about 1,200 feet south of, at milepost "J. 123-M. 108," 45 feet to left of center of track; iron post.....	145. 385

SWAN LAKE NORTH TO LOCOPOLIS, THENCE EAST 4 MILES.

Swan Lake, 0.5 mile east of, 15 feet south of west end of iron bridge, in top of concrete monument. aluminum tablet stamped "148.308".....	148. 431
Swan Lake, 0.5 mile east of, 15 feet south of west end of iron bridge, on south side of concrete monument; brass pin.....	144. 829

Swan Lake, 2.1 miles east of, in Walter Powell's yard, in root of gum tree; nail.....	Feet. 146.56
Sharkey, 2 miles north of, on river bank at Green London's house, in cottonwood tree; spike.....	145.01
Locopolis, 1.2 miles southwest of, on Webb-Locopolis road, 300 feet west of Madison White's house, in gum tree; spike.....	149.93
Locopolis, 100 feet west of ferry, in oak tree; spike.....	139.77
Jarmon Ferry, 2 miles east of; high water mark, 1905.....	150.27
Locopolis, Denman's house, 1,000 feet east of second long bridge east of, at sharp turn, on north of road, in root of 14-inch red oak; nail.....	146.30
Locopolis, 3.5 miles east of, 1,200 feet east of bridge over bayou, in woods, on north side of road, 8 feet east of small gum tree; iron post stamped "Prim. Trav. Sta. No. 35-A".....	150.277
Bayou, 1,000 feet west of, by small field with negro cabin in center, south of road; on big pecan tree.....	148.72

## POINT 6 MILES SOUTH OF PAYNES SOUTH TO COUNTY LINE.

Paynes, 6.7 miles south of, about 2.5 miles north of county line, west of road; root of small honey locust, bench mark No. 17.....	197.70
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## POINT 6 MILES SOUTH OF PAYNE'S WEST TO BRUSHY BAYOU, THENCE DOWN BRUSHY BAYOU TO GREEN LEE DEADENING, THENCE SOUTHWEST ACROSS TIPPO BAYOU TO POINT 2.5 MILES NORTHEAST OF PHILIPP.

T. P. Shannon's place, about 1 mile west of, at end of lane, root of 20-inch water oak; bench mark A.....	136.02
Dr. Franklin's place, at corner of garden, on bank of Wrong Prong Bayou, root of dead white oak tree; bench mark D.....	138.64
Brushy Bayou, on east bank of and east of road, 1 mile northeast of Green Lee deadening, on 30-inch pin oak; bench mark H.....	133.70
Taylor mill, 2 miles southwest of, about 0.25 mile northwest of end of lane leading to river road, root of hackberry tree; bench mark N.....	136.60

## GLENDDORA SOUTHEAST ALONG YAZOO &amp; MISSISSIPPI VALLEY RAILROAD TO MONEY.

Black Bayou tank, about 0.9 mile south of, at milepost "J. 120-M. 111," 45 feet east of track; iron post.....	145.317
Black Bayou Junction, about 0.8 mile south of, west of track, 50 feet north of milepost "J. 118-M. 113," in base of 18-inch black locust tree; spike..	141.70
Philipp, at corner of Beard & Co.'s old store; iron post stamped "Prim. Trav. Sta. No. 46-A, 1908 MISS".....	142.476
Philipp, about 2.5 miles south of, east of milepost "J. 109-M. 122," 50 feet from center of track; iron post.....	138.500
Philipp, 3 miles south of, on lower or most southerly line of Tallahatchie County, east side of river, 150 feet from bank, 50 feet west of station 1 of traverse; 24-inch sycamore tree (Murphy's bench mark).....	134.82
Geren, 0.7 mile south of, 50 feet east of milepost "J. 108-M. 125," iron post..	137.231

## PHILIPP NORTHEAST 2.5 MILES.

Philipp, 2.5 miles northeast of, in front of negro house, on root of 48-inch water oak; bench mark O.....	139.45
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## MONEY SOUTH ALONG YAZOO &amp; MISSISSIPPI VALLEY RAILROAD TO GREENWOOD.

Money, 0.3 mile south of, at milepost "J. 103-M. 128," 50 feet east of track; iron post.....	136.508
Craig siding, 1 mile north of, at milepost "J. 100-M. 131," 100 feet east of track; iron post.....	128.904

Greenwood, 3.8 miles north of, 100 feet east of milepost "J. 97-M. 184;" iron post.....	Feet. 125. 115
Greenwood, 150 feet west of northwest corner of Yazoo & Mississippi Valley Railroad station, south side of street in angle made by Armour Packing Co.'s building and Cassety dry goods store; iron pipe 3 inches in diameter, projecting 6 inches above ground.....	130. 281
Greenwood, in courthouse yard (U. S. Army Engineers' bench mark No. 24); top of cap on pipe.....	133. 388
Greenwood, in courthouse yard (U. S. Army Engineers' bench mark No. 24); stone.....	129. 311

**Brandon, Florence, Jackson, Raymond, and Terry quadrangles.**

**HINDS, COPIAH, MADISON, AND SIMPSON COUNTIES.**

The elevations in the following list were determined by primary leveling extended from the Coast and Geodetic Survey precise level line along the Alabama & Vicksburg Railway (Queen & Crescent Route).

The leveling was done in the Brandon, Raymond, and Terry quadrangles in 1905 by W. W. Franklin; in the Jackson quadrangle in 1901 by J. R. Ellis, and in 1905 by Franklin; and in the Florence quadrangle in 1906 by F. L. Foust.

**JACKSON QUADRANGLE.**

**JACKSON NORTH ALONG ILLINOIS CENTRAL RAILROAD TO MADISON.**

Jackson, bottom of a square cut in stone water table, basement of the United States courthouse and post office, under center of east window in north front of building; square is cut one-fourth inch deep and lettered thus: U. S. C. & □ G. S. B. M.....	Feet. 297. 722
Jackson, 2.2 miles north of, on main Jackson and Canton road, in northwest corner of yard to attendants' residence and about 20 feet east of main entrance to grounds of State insane asylum; iron post stamped "322 ADJ 1903".....	322. 188
State insane asylum, 100 feet north of station; top of west rail of main track.....	309. 7
Tougaloo, 150 feet southeast of station, 135 feet due east of switch stand, 3 feet south of porch of storehouse of W. R. Shearer; iron post stamped "314 ADJ 1903".....	314. 125
Ridgeland, 0.4 mile south of, 10 feet east of track, 50 feet west of public highway, in top of bridge culvert; aluminum tablet stamped "353 ADJ 1903".....	352. 836
Ridgeland, in front of station; top of east rail.....	355. 4
Madison, in north wall of John McKay's store; bronze tablet stamped "334.5 JACKSON".....	334. 809
Madison, east wall of brick storehouse occupied by Madison Mercantile Co.; aluminum tablet stamped "335 ADJ 1905".....	334. 645

**MADISON WEST ALONG HIGHWAY TO ROBINSON'S SPRINGS.**

Madison, 4 miles northwest of, 240 feet south of Chinaberry schoolhouse, on east side of road, at junction of road, in stone; bronze tablet stamped "415 JACKSON".....	415. 287
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Madison, 4.4 miles northwest of station, 50 feet southwest of cabin on Stokes place, 25 feet off east edge of road; iron post stamped "408 ADJ 1903"...	Feet. 408. 493
Robinson's springs, 300 feet north of Mrs. Robinson's residence, 12 feet north of large pine tree, near center of lawn, in limestone boulder; bronze tablet stamped "331 ADJ 1903".....	330. 858

## JACKSON NORTHEAST ALONG HIGHWAY TO LUCKNOW, THENCE SOUTHEAST TO GREENFIELD

Jackson, 4.8 miles east of, 40 feet off west edge of main Jackson and Lucknow road, in grass plot; iron post stamped "271 ADJ 1903".....	271. 460
Lucknow, 2 miles southwest of, 150 feet off north edge of road, 2 feet west of southwest corner of Liberty Baptist Church; iron post stamped "302 ADJ 1903".....	301. 905
Lucknow, 1.3 miles south of, on embankment in center of grass plot where public road forks to east to Brandon, 25 feet south of southwest corner of yard of residence of Mary Feet, house owned by J. W. Lovelace; iron post stamped "355 ADJ 1903".....	354. 930

## BRANDON QUADRANGLE.

## AT BRANDON.

Brandon, in southwest corner of pasture on stock farm of S. P. Barton, 250 feet northeast of station; iron post stamped "391 ADJ 1903".....	391. 630
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## FLORENCE QUADRANGLE.

## JACKSON SOUTH ALONG ILLINOIS CENTRAL RAILWAY TO BYRAM.

Pearl station, northeast corner of yard of two-story yellow frame house, on west side of track, in front of station; iron post stamped "266 ADJ 1903"...	266. 124
Byram, 0.2 mile north of station, large concrete culvert 737.94, over Trayon Creek, in top of west wall; aluminum tablet stamped "264 ADJ 1903"...	263. 862

## GREENFIELD SOUTH VIA MONTEREY TO REXFORD, THENCE WEST TO ALONZO, THENCE NORTH TO BYRAM.

Greenfield, 100 feet north of track, southwest corner of post office and storehouse of W. L. Mangren; iron post stamped "313 ADJ 1903".....	313. 385
Greenfield post office, in top of retaining wall of culvert (small earthenware pipe), under railroad, north of track and near outer edge of wall; bottom of a square cut.....	311. 256
Monterey, 30 feet south of center of road, 3 feet west of northwest corner of storehouse of J. L. Floyd; iron post stamped "432 ADJ 1903".....	432. 640
Monterey, 3.5 miles south of, at main highway to Star, in northeast corner of intersection of crossroads; iron post stamped "346 ADJ 1903".....	346. 095
Star, 70 feet north of northeast corner of station, 83 feet northwest of northwest corner of post office, in grass plot; iron post stamped "418 ADJ 1903"...	418. 504
Rexford, 4.5 feet north of northeast corner of Barlow's store; iron post stamped "424 ADJ 1903".....	424. 635
Rexford, 3.4 miles west of, summit of hill north of Limestone Creek where road makes sharp bend to west, settlement road to northeast, 21 feet south of center of road, 2.5 feet north of northwest corner of carriage house of N. G. Barlow; iron post stamped "390 ADJ 1903".....	390. 188
Alonzo, 5 miles east of, 0.2 mile south of Barron's store, in southwest corner of public road fork; iron post stamped "394 ADJ 1903".....	394. 592
Alonzo, 0.8 mile southeast of post office, in northwest corner of intersection of fork to north; iron post stamped "296 ADJ 1903".....	296. 581



Whites post office (discontinued), 35 feet south of center of road, 2.5 feet west of northwest corner of post office and store of J. D. Sandiper; iron post stamped "356 ADJ 1903".....	Feet. 356. 761
Sinai post office, 0.5 mile north of, summit of short steep hill, west edge of road, at southeast corner of fence around small negro cabin; iron post stamped "319 ADJ 1903".....	319. 656

GREENFIELD WEST TO PEARSON, THENCE SOUTHWEST TO PLAIN, THENCE SOUTH TO FLORENCE,  
THENCE NORTHEAST TO MONTEREY.

Pearson, 300 feet southeast of station, 50 feet south of highway crossing, northeast corner of Williams's store; iron post stamped "287".....	287. 150
Plain, 500 feet northwest of station, at forks in road, at southeast corner of post office; iron post stamped "276".....	276. 493
Plain, 2.9 miles south of, 100 feet west of road crossing, at forks in road; iron post stamped "334".....	334. 154
Plain, on Gulf and Ship Island Railroad, west of station, near center of town, at northeast corner of post office; iron post stamped "313".....	313. 382
Florence, 2.1 miles east of, at top of hill, crossing second-class road; iron post stamped "393".....	393. 597

RAYMOND QUADRANGLE.

CLINTON NORTH ALONG HIGHWAY TO POCAHONTAS, THENCE NORTHEAST TO ROBINSON SPRING.

Clinton, 0.8 mile west of, in top of coping stone of arch culvert, north of track, a little west of center of arch, bottom of square cut; lettered thus: U. S. □ B. M.....	332. 350
Clinton, 4.6 miles north of, 300 feet south of Bogue Chitto Creek crossing, on embankment, 20 feet off west edge of road; iron post stamped "230 ADJ 1903".....	230. 248
Pocahontas, 4.2 miles southwest of, fork of road to south, bend to southwest, on embankment about 10 feet opposite east edge of road; iron post stamped "243 ADJ 1903".....	243. 132
Pocahontas, in foundation under southwest corner of storehouse of W. R. Lane; aluminum tablet.....	237. 490
Pocahontas, at southwest corner of Methodist Church; iron post stamped "245 ADJ 1903".....	245. 118

TERRY QUADRANGLE.

BYRAM SOUTHWEST ALONG ILLINOIS CENTRAL RAILROAD TO TERRY THENCE ALONG HIGHWAY  
SOUTHWEST, WEST, AND NORTH TO DRYGROVE (SINGLE SPUR LINE).

Byram, in front of station; top of east rail.....	264. 4
Byram, 2.7 miles south of, in top of concrete culvert 740.97, aluminum tablet stamped "270 ADJ 1903".....	270. 401
Terry, 100 feet north of station, 3 feet west of west track, in top of concrete wall of bridge over highway; aluminum tablet stamped "291 ADJ 1903".....	291. 283
Terry, 4.8 miles south of, 175 feet west of main Jackson and Crystal Springs road, 15 feet south of road running east-west; iron post stamped "421 ADJ 1903".....	420. 805
Terry, 8.7 miles southwest of, at junction of public road northwest and southeast, 2 miles northwest of Crystal Springs, on embankment; iron post stamped "420 ADJ 1903".....	419. 955
Thompsonville, 3.6 miles southeast of, about 100 feet east of main Raymond road which forks to north, just off south edge of road at northwest corner of fence of small negro cabin; iron post stamped "354 ADJ 1903".....	354. 087

Thompsonville post office, 7 feet south by 10 feet west of southeast corner of storehouse of J. E. Bankston, on west edge of road; iron post stamped "334 ADJ 1903" .....	Feet. 334. 655
Dabneys crossroads, 300 feet north of, just off east edge of road, at southwest corner of large church; iron post stamped "348 ADJ 1903" .....	347. 681
Drygrove, southeast corner of large frame storehouse, west edge of road; iron post stamped "375 ADJ 1903" .....	374. 805

**Burnsville and Iuka quadrangles.****TISHOMINGO COUNTY.**

The elevations in the following list were determined by primary leveling extended from the precise level line of the Coast and Geodetic Survey passing through this area and that of the United States Corps of Engineers along Tennessee River.

The leveling was done in 1909 by William Oram.

**IUKA QUADRANGLE.****IUKA NORTHWEST ALONG SOUTHERN RAILWAY TO BURNSVILLE.**

Iuka, 2,250 feet west of station, 1,190 feet west of milepost 115, in south end of stone culvert, in top of stone, 5.8 inches from south edge and 37.8 inches from west edge; copper bolt (Precise bench mark 3, U. S. Army Engineers) .....	Feet. 564. 838
Iuka, 3 miles west of, 200 feet west of grade crossing, southeast corner of stone box culvert; aluminum tablet stamped "491 IUKA" .....	490. 782

**IUKA SOUTHEAST ALONG SOUTHERN RAILWAY TO PEGRAM.**

Iuka, in front of station; top of rail. ....	556. 5
Iuka, 0.7 mile east of, south of track; copper nail in root of pine tree marked "564" .....	564. 08
Gravel siding, 0.6 mile west of, bolt farthest west on north side of track in railroad bridge; marked "531" .....	530. 41
Gravel siding, abandoned turntable west side, 50 feet north of track, 80 feet west of station; aluminum tablet stamped "497." (This bench mark may be 0.2 foot lower than the elevation given.) .....	497. 035
Gravel siding, 0.6 mile east of, bolt farthest east on south side of track on railroad bridge; marked "469" .....	467. 88
Pegram, 1 mile west of, 0.5 mile east of milepost 120, west abutment of bridge, northwest corner of coping stone (precise bench mark 41); square cut in stone .....	433. 210

**IUKA SOUTH ALONG ROADS 3 MILES AND RETURN.**

Iuka, 2.2 miles south of, 400 feet south of house, in root of large oak tree, copper nail marked "598" .....	597. 974
Iuka, 3.3 miles south of, at intersection, 50 feet south of stream crossing, east side of road; iron post stamped "548" .....	547. 922

**BURNSVILLE QUADRANGLE.****AT BURNSVILLE.**

Burnsville, 195 feet south of station, in west wall of brick house owned by M. O. Elledge, in fifteenth course of brick from ground; copper bolt (Precise bench mark 1, U. S. Army Engineers) .....	470. 024
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DEPARTMENT OF THE INTERIOR  
UNITED STATES GEOLOGICAL SURVEY

GEORGE OTIS SMITH, DIRECTOR

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BULLETIN 459

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RESULTS OF SPIRIT LEVELING  
IN MISSOURI

1896 TO 1909, INCLUSIVE

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R. B. MARSHALL, CHIEF GEOGRAPHER

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WORK DONE IN COOPERATION WITH THE STATE OF MISSOURI  
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# RESULTS OF SPIRIT LEVELING IN MISSOURI, 1896 TO 1909, INCLUSIVE.

R. B. MARSHALL, Chief Geographer.

## INTRODUCTION.

*Scope of the work.*—All results of spirit leveling in the State of Missouri previously published by the United States Geological Survey and all the results of later work are included in this report, rearranged by quadrangles. All elevations are based on the precise level net as adjusted in 1907 by the Coast and Geodetic Survey to a common mean sea level datum. The part of this net which lies within or along the borders of Missouri comprises the line of the Coast and Geodetic Survey across the State from St. Louis to Kansas City and from Kansas City southward to the southwest corner of the State; the line of the Mississippi River Commission along the eastern boundary of the State; and the line of the Missouri River Commission along the Missouri River from its mouth northwestward to the northwest corner of the State.

*Personnel.*—The field work previous to 1903 was done under the general direction of J. H. Renshaw, geographer; that from 1903 to 1906, inclusive, under H. M. Wilson, geographer; and the later work under W. H. Herron, geographer, under the general direction of R. B. Marshall, chief geographer. The names of the various levelmen are given in the introduction to each list. The office work of computation, adjustment, and preparation of lists was done mainly by S. S. Gannett, geographer, and D. H. Baldwin, topographer, and since 1907 under the general direction of E. M. Douglas, geographer.

*Classification.*—The elevations are classified as precise or primary according to the methods employed in their determination. For precise level lines instruments and rods of the highest grade known are used, each line is run both forward and backward, and every precaution is taken to guard against error. The allowable divergence between the forward and backward lines in feet is represented by the formula  $0.017\sqrt{D}$ , in which D is the distance in miles between bench marks. For primary lines standard Y levels are used; lines are run



in circuits or are closed on precise lines, with an allowable closing error represented in feet by the formula  $0.05\sqrt{D}$ , in which  $D$  is the length of the circuit in miles, sufficient care being given the work to maintain this standard. For levels of both classes careful office adjustments are made, the small outstanding errors being distributed over the lines.

*Bench marks.*—The standard bench marks are of two forms. The first form is a circular bronze or aluminum tablet (*C* and *E*, Pl. I),  $3\frac{1}{2}$  inches in diameter and one-fourth inch thick, having a 3-inch stem, which is cemented in a drill hole in solid rock in the wall of some public building, bridge abutment, or other substantial masonry structure. The second form (*F*, Pl. I), to be set in the ground where no masonry or rock is available, consists of a hollow wrought iron post  $3\frac{1}{2}$  inches in outside diameter and 4 feet long. The bottom is spread out to a width of 10 inches in order to give a firm bearing on the earth. A bronze or aluminum-bronze cap is riveted over the top of the post. A third style of bench mark with abbreviated lettering (*B* and *D*, Pl. I), is used for unimportant points. This consists of a special copper nail  $1\frac{1}{2}$  inches in length driven through a copper washer seven-eighths inch in diameter. The tablets as well as the caps on the iron posts are appropriately lettered, and where States have cooperated in the work the fact of such cooperation is indicated by the addition of the State name (*G*, Pl. I).

The numbers stamped on the bench marks described in the following pages are the elevations to the nearest foot as determined by the level man. These numbers are stamped with three-sixteenths inch steel dies on the tablets or post caps, to the left of the word "feet." The office adjustment of the notes and the reduction to mean sea level datum may so change some of the figures that the original markings are 1 or 2 feet in error. It is assumed that engineers and others who have occasion to use the bench-mark elevations will apply to the Director of the United States Geological Survey, at Washington, D. C., for their adjusted values, using the markings as identification numbers only.

*Datum.*—All elevations taken by the United States Geological Survey are referred to mean sea level, which is the level that the sea would assume if the influence of tides and winds were eliminated. This level is not the elevation determined from the mean of the highest and lowest tides, nor is it the half sum of the mean of all the high tides and the mean of all the low tides, which is called the half-tide level. *Mean sea level is the average height of the water, all stages of the tide being considered.* It is determined from observations made by means of tidal gages placed at stations where local conditions, such as long, narrow bays, rivers, and like features will not affect the height of the water. To obtain even approxi-



## GEOLOGICAL SURVEY BENCH MARKS.

- A. Tablet used in cooperating States. The State name is inserted at *G*.  
 B and D. Copper temporary bench mark, consisting of a nail and copper washer.  
 A, C, and E. Tablets for stone or concrete structures.  
 F. Iron post used where there is no rock.



mately correct results, these observations must extend over at least one lunar month, and if great accuracy is desired they must extend over several years. At ocean stations the half-tide level and mean sea level usually differ but little. It is assumed that there is no difference between the mean sea level as determined from observations in the Atlantic Ocean, Gulf of Mexico, or the Pacific Ocean.

The connection with tidal stations for bench marks in certain areas that lie at some distance from the seacoast is still uncertain, and this fact is indicated by the addition of a letter or word to the right of the word "Datum" on tablets or posts. For such areas corrections for published results will be made from time to time as the precise level lines of the Geological Survey or other government organizations are extended.

*Topographic maps.*—Maps of the following quadrangles wholly or partly in Missouri have been published by the United States Geological Survey up to April 15, 1911. They may be obtained, except as noted, for 5 cents each, or \$3 a hundred, on application to the Director of the Survey at Washington, D. C.

Atchison (Kans.-Mo.).	Leavenworth (Kans.-Mo.).
Atlanta.	Lexington.
Bolivar.	Louisiana (Mo.-Ill.).
Bonnetterre.	Macon.
Boonville.	Marshall.
Butler.	Mexico.
Carthage.	Moberly.
Clinton.	Mound City (Kans.-Mo.).
De Soto.	Mountain Home (Ark.-Mo.).
Edina.	Nebraska City (Nebr.-Iowa-Mo.)
Eldon. <sup>1</sup>	Nevada.
Eureka Springs (Ark.-Mo.).	O'Fallon (Mo.-Ill.).
Farmington.	Olathe (Kans.-Mo.).
Fayetteville (Ark.-Mo.).	Oskaloosa (Kans.-Mo.).
Forsyth.	Palmyra.
Fort Scott (Kans.-Mo.).	Potosi.
Fulton.	St. Louis (Mo.-Ill.), double sheet (10 cents).
Glasgow.	St. Louis, city of (30 cents).
Gravois Mills. <sup>1</sup>	Sedalia.
Greenfield.	Springfield.
Harrison (Ark.-Mo.).	Stockton.
Harrisonville.	Sullivan.
Hermann.	Tuscumbia.
Higdon.	Versailles. <sup>1</sup>
Independence.	Warrensburg.
Jefferson City.	Warsaw.
Joplin (Kans.-Mo.-Okla.).	Weingarten (Mo.-Ill.).
Joplin district (Mo.-Kans.-Okla.), double sheet (10 cents).	Wyandotte (Okla.-Mo.-Kans.).
Kahoka (Mo.-Iowa-Ill.).	Yellville (Ark.-Mo.).
Kansas City (Kans.-Mo.).	

<sup>1</sup> Eldon and Gravois Mills sheets show parts of Versailles quadrangle on larger scale.

## PRECISE LEVELING.

De Soto, O'Fallon, and Sullivan (30') Quadrangles and Condray, Knobview, Redbird, and Rolla (15') Quadrangles.

## CRAWFORD, FRANKLIN, AND PHELPS COUNTIES.

The elevations in the following list are based upon the 1907 adjustment elevation of a bench mark of the United States Army Engineers near Labadie, Mo. Precise methods were used, the line being run in both directions. The line begins near Labadie and follows the Missouri Pacific Railway east to Pacific, thence southwest along the St. Louis & San Francisco Railroad to Arlington, a total distance of 99 miles.

The work was done in 1908 by E. L. McNair.

## O'FALLON QUADRANGLE.

## Near Labadie.

Labadie, 1.1 miles west of, at west end of large rock through cut about 18½ feet lower than track, 1 foot inside wire fence along right of way; United States Army Engineer's bench mark, iron post, top of cap.....	Feet. 472.692
Labadie, in front of station; top of rail.....	495.1

## DE SOTO QUADRANGLE.

Gray Summit east along Missouri Pacific Ry. to Pacific, thence southwest along St. Louis & San Francisco R. R. to St. Clair.

Gray Summit, about 55 feet west of station, 26 feet northeast of main track, 6 feet southeast of milepost 41, 25 feet northwest of road crossing; iron post stamped "633".....	633.393
Gray Summit, in front of station; top of rail.....	633.0
Pacific, L. E. Roemer's store on Main Street, two doors east of post office, in southeast corner of foundation; bronze tablet stamped "466".....	466.895
Pacific station, about 0.4 mile west of, 55 feet east of center of track of main line St. Louis & San Francisco R. R., 40 feet west of corner of Anton Brandt's house, just outside picket fence, 3 feet southwest of fence corner, 9 feet east of center of highway; iron post stamped "465".....	465.249
Pacific, 2.5 miles west of, north side of track, at east end of Meramec River bridge, on top of pier; chiseled square.....	469.17
Catawissa, in front of station; top of rail.....	531.2
Robertsville, about 90 feet east of station, 22 feet south of center of track, at fence corner inclosing section house; iron post stamped "515".....	504.512
Robertsville, in front of station; top of rail.....	504.2
Moselle, 2.25 miles east of, about 0.5 mile east of milepost 44, 5 feet east of farm crossing, 10 feet north of center of track; iron post stamped "517".....	507.489
Moselle, 65 feet west of station, about 30 feet north of center of track, 2 feet west of telegraph pole; iron post stamped "507".....	497.444
St. Clair, 3.1 miles east of, about 470 feet west of milepost 49, 20 feet west of road crossing, at corner of right of way fences; iron post stamped "699".....	688.465
St. Clair, northwest corner of North Street and Springfield Road, 2.3 feet from fire hydrant, in pavement; copper bolt stamped "780" (old bench mark).....	769.798
St. Clair, in front of station; top of rail.....	767.7

**SULLIVAN QUADRANGLE.****St. Clair southwest along St. Louis & San Francisco R. R. to Fanning.**

	Feet. -
Anaconda, in front of station; top of rail.....	842. 6
Anaconda, about 72 feet north of center of track, about 2.5 feet from telephone pole and near fence corner of lot owned by W. M. Daugherty; iron post stamped "851".....	840. 982
Stanton, in front of station; top of rail.....	872. 5
Stanton, about 60 feet west of station, 60 feet from center of track, in southeast corner of foundation to dwelling house and hotel owned by Joseph Schumke, in corner stone; bronze tablet stamped "882".....	872. 250
Stanton, 2 miles west of, 100 feet west of road crossing, 2.5 feet inside of right of way fence, 10 feet northwest of telegraph pole; iron post stamped "910".....	898. 708
Sullivan, about 100 feet east of station, in foundation of Bennett Hotel, at south side of main entrance; aluminum tablet stamped "987".....	976. 715
Sullivan, in front of station; top of rail.....	971. 0
Sullivan, 3 miles west of, about 35 feet west of road crossing, near milepost 71, 20 feet south of center of track, 3 feet from wire fence; iron post stamped "1035".....	1, 024. 012
Bourbon, in front of station; top of rail.....	954. 6
Bourbon, about 150 feet west of station, 60 feet north of center of track, in corner stone of foundation wall at southeast corner of Bourbon Hotel; old bench mark stamped "967".....	956. 803
Coffeyton station, opposite semaphore stand, 65 feet west of center of track, 35 feet southwest of oak tree, 1.5 feet from picket fence; iron post stamped "1036".....	1, 024. 823
Coffeyton, in front of station; top of rail.....	1, 023. 3
Leasburg, about 35 feet east of station, in west foundation wall of old Exchange Hotel, 2 feet from corner, building owned by W. D. Davis; aluminum tablet stamped "1036".....	1, 024. 870
Hofflin flag station, about 700 feet east of, on south side of track, 6 feet from right of way fence, about 7 feet above track; iron post stamped "1049".....	1, 037. 765
Hofflin flag station, in front of; top of rail.....	1, 039. 1
Cuba, in front of station; top of rail.....	1, 015. 5
Cuba, southwest corner of foundation of Grand Hotel; aluminum tablet stamped "1045" (old bench mark).....	1, 035. 244
Fanning, in front of station; top of rail.....	1, 059. 1
Fanning, 15 feet west of station platform, 15 feet south of center of track, 15 feet north of right of way fence; iron post stamped "1071".....	1, 060. 545

**REDBIRD QUADRANGLE.****Fanning southwest along St. Louis & San Francisco R. R. to St. James.**

Knobview, 90 feet east of station, about 45 feet south of center of track, 12 feet east of gate at farm road crossing, 2 feet north of right of way fence; iron post stamped "1084".....	1, 074. 125
Knobview, in front of station; top of rail.....	1, 072. 2

**CONDRAY QUADRANGLE.****St. James southwest along St. Louis & San Francisco R. R. to Rolla.**

St. James, in front of station; top of rail.....	1, 089. 5
St. James, corner of Meramec and Washington Streets, about 70 feet north of center of track, 25 feet from corner of Commercial Hotel, in angle between cross walk and sidewalk; iron post stamped "1098".....	1, 087. 920

St. James, 2.5 miles west of, 35 feet east of road crossing, 35 feet south of center of track, 2.5 feet from corner fence post in right of way fence; iron post stamped "1098".....	Feet. 1,087.843
Dillon, in front of station; top of rail.....	1,093.5
Dillon, 55 feet west of station, 40 feet south of center of railroad track, 2 feet north of right of way fence; iron post stamped "1103".....	1,092.670
Dillon, 1.8 miles west of, 65 feet west of road crossing, 10 feet west of telephone pole, 2 feet north of right of way fence; iron post stamped "1185".	1,184.657

**ROLLA QUADRANGLE.**

*Rolla west along St. Louis & San Francisco R. R. to Arlington.*

Rolla, on Pine Street, in yard of residence owned by B. L. Knapp, 8 feet west of cement house walk, 4 feet south of public sidewalk; iron post stamped "1130" (originally set as meridian mark).....	1,129.566
Rolla, in front of station; top of rail.....	1,099.0
Rolla, 2.25 miles west of, about 30 feet south of center of track, 6 feet east of corner post of right of way fence, 15 feet east of road at crossing; iron post stamped "975".....	975.121
Newburg, 3.5 miles east of, on top of bank of cut, 6 feet above track, 40 feet west of little used public road, 2 feet north of right of way fence; iron post stamped "807".....	807.384
Newburg, in front of station; top of rail.....	711.9
Newburg, 10 feet south of southeast corner of Sullivan House, in line with row of maple trees, about 3 feet from sidewalk; iron post stamped "712".	711.852
Newburg, 1.8 miles west of, about 70 feet west of road crossing, 28 feet south of center of track, 25 feet north of northeast corner of brick building (former storehouse of Ozark Iron Works), 2 feet north of wire fence; iron post stamped "701".....	700.897
Arlington, in front of station; top of rail.....	695.4
Arlington, 0.2 mile west of station, south end of east pier of bridge over Gasconade River, 1 foot south of outside anchor bolt, in capstone; aluminum tablet stamped "687".....	686.773

**PRIMARY LEVELING.****St. Louis Quadrangle.****ST. LOUIS COUNTY.**

The elevations in the following list are based on the "city directrix" or bench mark "K<sub>3</sub>" of the Coast and Geodetic Survey at St. Louis, a T cut on the top surface of a pedestal level with the curbstone on Front Street, near Market Street. The elevation of this pedestal, which formerly supported a monument, is now accepted as 413.968 feet above mean sea level, as determined by the 1907 adjustment. The connection with this bench mark was obtained through precise leveling of the city of St. Louis.

The leveling was done in 1903 by L. Scott Smith.

**ST. LOUIS QUADRANGLE.**

*St. Louis west along highway to Barrett, thence south to Valley Park and east via Mehlville to St. Louis.*

St. Louis, south side of Manchester Avenue, at city limits, 260 feet west of junction of avenue and Blenton Place; point in square cut in northeast angle of cross on top of city-limit stone 71.....	Feet. 482.643
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Kirkwood, southwest abutment of bridge across Missouri Pacific Ry. tracks, south of Main Street; aluminum tablet stamped "648 ST. LOUIS"....	Feet. 647. 915
Barret, 1 mile northeast of station, iron bridge over Sugar Creek; center of square cut on southeast abutment.....	446. 52
Fenton, iron bridge over Meramec River; square cut on southwest abutment.....	423. 468
Mehlville, 0.25 mile northwest of, stone culvert on south side of road; aluminum tablet stamped "595 ST. LOUIS".....	594. 808

**Kirkwood north along highway to Dwyers, thence east to St. Louis.**

Clayton, courthouse grounds, northwest of courthouse, in large square stone; aluminum tablet stamped "610 ST. LOUIS".....	609. 259
St. Louis, city bench mark No. 69, city elevation 511. 890.....	511. 89

**Barret Station north along highway to Fern Ridge, thence east to Stratman and south to Dwyers.**

Fern Ridge post office, 0.2 mile east of, at junction of Mason and Olive Streets, on south side, in stone culvert; aluminum tablet stamped "559 ST. LOUIS".....	558. 913
Creve Cœur post office, 1 mile east of, at road fork to north, just north of telegraph pole, in center of triangle; cross cut on top of section stone....	683. 25

**Fern Ridge northeast along highway to Pattonville, thence east and south to city limits.**

Pattonville, 1.6 miles southeast of, northeast abutment of wagon bridge; aluminum tablet stamped "554 ST. LOUIS".....	554. 09
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**O'Fallon Quadrangle.**

**FRANKLIN, LINCOLN, ST. CHARLES, AND ST. LOUIS COUNTIES.**

The elevations in the following list are based on the Missouri River Commission bench mark No. 21 at St. Charles. The bench mark is on the north side of Lawrence Street, 25 feet west of the center of Missouri, Kansas & Texas Railway track, in the southeast corner of David Lane's lot, 1 foot west from the fence. It is the top of an iron post over a copper bolt in the bench-mark stone. The elevation is 449.509 feet above mean sea level by the 1907 adjustment.

The leveling in the part of the quadrangle south of the Missouri River was done in the season of 1897 by Jesse L. Holman, and that in the part north of the river in the season of 1898 by Charles La Rue.

**O'FALLON QUADRANGLE.**

Manchester, SE. $\frac{1}{4}$ sec. 36, T. 45 N., R. 4 E., near Henry Avenue and Manchester Rock Road; iron post stamped "St. L. 512".....	Feet. 513. 538
T. 44 N., R. 4 E., SW. $\frac{1}{4}$ sec. 5, north of State Road, 500 feet northeast of Mr. Shotwell's log house; iron post stamped "St. L. 739".....	740. 484
T. 44 N., R. 3 E., SE. $\frac{1}{4}$ sec. 17, on south side of State Road; iron post stamped "St. L. 670".....	671. 344
T. 44 N., R. 2 E., NW. $\frac{1}{4}$ sec. 25, near junction of Manchester Rock Road and road to Pacific; iron post stamped "St. L. 799".....	800. 774
T. 45 N., R. 3 E., near southwest corner H. Hilkenkamp's store; iron post stamped "St. L. 670".....	672. 112
Chantilly, T. 49 N., R. 1 E., NE. $\frac{1}{4}$ sec. 24, northwest corner schoolhouse grounds; iron post stamped "St. L. 634".....	635. 028



	Feet.
Troy, in foundation of county courthouse; aluminum tablet stamped "572".	573. 219
Mocow Mills, wagon road bridge over Cuivre River, north end of abutment; aluminum tablet stamped "St. L. 461".....	462. 446
Flint Hill, stone doorsill of stone building owned by Bernard Beller; aluminum bolt stamped "St. L. 551" .....	552. 23
T. 49 N., R. 3 E., NE. $\frac{1}{4}$ sec. 29, in yard of Smedley district schoolhouse; iron post stamped "St. L. 574" .....	575. 592
T. 44 N., R. 2 E., Vale, foundation of Catholic school building; aluminum tablet stamped "St. L. 518".....	518. 962
Gilmore, opposite east end of Wabash Railroad station, T. 44 N., R. 2 E.; iron post stamped "St. L. 562" .....	562. 929
St. Peters, T. 47 N., R. 3 E., in parapet wall of west abutment of Wabash Railroad bridge; aluminum tablet stamped "St. L. 445" .....	446. 588
Cottleville, T. 46 N., R. 3 E., foundation of public school building; aluminum tablet stamped "St. L. 516".....	517. 795
Mechanicsville, T. 46 N., R. 2 E., in yard of Howell Institute building; iron post stamped "St. L. 719" .....	720. 926
T. 45 N., R. 2 E., Missouri, Kansas & Texas Ry. bridge over Little Pemme Osage Creek, north end of east abutment; aluminum bolt stamped "St. L. 462" .....	463. 306
Augusta, SE. $\frac{1}{4}$ sec. 11, T. 44 N., R. 1 E., 350 feet northwest of German Evangelical Church, in ledge of white limestone rock; aluminum tablet stamped "St. L. 613".....	614. 417
Dutzow, T. 44 N., R. 1 E., south wall of Wengleford's hardware store; aluminum tablet stamped "St. L. 497".....	498. 269
Femme Osage, SW. $\frac{1}{4}$ sec. 20, T. 45 N., R. 1 E., in foundation of German Evangelical Church; aluminum tablet stamped "St. L. 659".....	660. 469
T. 44 N., R. 1 W., NE. $\frac{1}{4}$ sec. 24, on land of Charles Birbonne, north side of road from Femme Osage to Mechanicsville; iron post stamped "St. L. 778".....	779. 550
Coppeln, SW. $\frac{1}{4}$ sec. 5, T. 45 N., R. 1 E., in stone doorsill of brick store building; aluminum bolt stamped "St. L. 829" .....	829. 943
T. 48 N., R. 1 W., NE. $\frac{1}{4}$ sec. 25, on land owned by Elizabeth Condor, west side of north-south wagon road; iron post stamped "St. L. 532".....	533. 527
T. 46 N., R. 1 W., SE. $\frac{1}{4}$ sec. 1, 3 miles south of Foristell, on north side of road; iron post stamped "St. L. 745".....	745. 952
T. 47 N., R. 1 W., SE. $\frac{1}{4}$ sec. 24, north wall of stone box-culvert under Wabash R. R. track, 0.25 mile west of Foristell; aluminum bolt stamped "St. L. 695" .....	696. 432
Dardenne, sec. 2, T. 46 N., R. 2 E.; cross mark cut on west end of upper stone step of Catholic Church.....	619. 19

#### De Soto Quadrangle.

#### FRANKLIN, JEFFERSON, AND WASHINGTON COUNTIES.

The elevations in the following list are based on that of a bronze tablet stamped "508," in the foundation of the opera house building at De Soto. The initial height on which the leveling in this locality rests is a level bench mark at De Soto, connected with the Mississippi River Commission bench mark "45/3" at Riverside, Mo. From these data the elevation of the central datum point is accepted as 508.971 feet above mean sea level.

The leveling was done by A. F. Montmorency and C. H. Dana in 1896.

Owing to excessive errors in closure of circuits the elevations given in this list are only approximate, excepting for the bench marks at Pacific and St. Clair, which were included in the precise leveling done in 1908.

## DE SOTO QUADANGLE.

## Jefferson County.

	Feet.
T. 43 N., R. 5 E., NE. $\frac{1}{4}$ sec. 7, on Gravois Road 3 miles north of High Ridge, at junction of road to Valley Park; iron post stamped "714"....	714. 706
High Ridge, SE. $\frac{1}{4}$ sec. 14, T. 43 N., R. 4 E., on road opposite post office; iron post stamped "926".....	927. 296
House Springs, NE. $\frac{1}{4}$ sec. 4, T. 42 N., R. 4 E., on north end of east abutment of bridge across Hedge Creek; bronze tablet stamped "465".....	466. 536
T. 42 N., R. 5 E., SE. $\frac{1}{4}$ sec. 18, 200 yards south of St. Paul's Church on road from House Springs to Antonia; iron post stamped "881".....	882. 164
Byrnesville, sec. 12, T. 42 N., R. 3 E., near center of southwest abutment of iron bridge over Big River; copper bolt stamped "459".....	460. 433
Bellows Creek post office, SW. $\frac{1}{4}$ sec. 10, T. 41 N., R. 4 E., iron post stamped "708".....	709. 485
Jarvis post office, 175 feet south of, SE. $\frac{1}{4}$ sec. 19, T. 41 N., R. 5 E., in rock on road; copper bolt stamped "530".....	531. 435
Morse Mills, in north abutment of bridge over Big River; bronze tablet stamped "494".....	495. 389
Hillsboro, sec. 3, T. 40 N., R. 4 E., in corner stone of county courthouse; bronze tablet stamped "801".....	802. 677
Ware, near post office, about center of sec. 11, T. 40 N., R. 3 E., in sandstone ledge on north bank of Dry Creek; copper bolt stamped "552"....	552. 646
T. 40 N., R. 5 E., northeast corner of sec. 19, 1 mile north of Victoria Station, in north abutment of bridge 28, on St. Louis, Iron Mountain & Southern Ry.; copper bolt stamped "451".....	451. 862
De Soto, southeast corner of foundation of opera house building; bronze tablet stamped "508".....	508. 971
Valles Mines station, 50 feet east of station, near center of sec. 5, T. 38 N., R. 5 E., iron post stamped "745".....	745. 934
T. 43 N., R. 3 E., near center of sec. 27, near Wilson's house, on rock on road from Pacific to Byrnesville; copper bolt stamped "479".....	479. 793
T. 39 N., R. 5 E., near southeast corner of sec. 30, on ledge of rock 300 feet east of Coles Mill, 2.5 miles northwest of Valles Mines station; copper bolt stamped "646".....	647. 437

## Franklin County.

T. 43 N., R. 1 W., SW. $\frac{1}{4}$ sec. 26, 0.5 mile east of Union, on capstone of southeast corner of stone bridge over Flat Creek; bronze tablet stamped "516".	516. 811
T. 43 N., R. 1 E., SW. $\frac{1}{4}$ sec. 16, 4 feet south of Coast and Geodetic Survey monument "Halleck"; iron post stamped "789".....	790. 242
Pacific, in northeast corner of sec. 12, T. 43 N., R. 2 E., southeast corner of foundation of L. E. Roemer's store on Main Street, two doors east of post office; bronze tablet stamped "466".....	466. 895
T. 42 N., R. 1 E., near center of sec. 26, 3.5 miles southeast of Moselle on main road to Grubville, templet of northwest abutment of iron bridge over Meramec River.....	508. 0

T. 41 N., R. 1 W., 6 feet south of northwest corner of sec. 1, in rock west of road; copper bolt stamped "699".....	Feet. 699. 684
St. Clair, 200 feet north of station, near northwest corner of sec. 36, T. 42 N., R. 1 W., corner stone of curb on southeast corner of Frederick Augerer's store; copper bolt stamped "769".....	769. 798
T. 41 N., R. 1 E., NW. $\frac{1}{4}$ sec. 1, 15 feet east of spring at S. H. Dixon's place, in rock; copper bolt stamped "515".....	515. 714
Grubville post office, near, NW. $\frac{1}{4}$ sec. 23, T. 41 N., R. 2 E., in southeast corner of yard of Dr. Davis's house; iron post stamped "908".....	908. 623
T. 41 N., R. 2 E., near southeast corner of sec. 32, in root of tree at forks of road; nail.....	803. 1
T. 42 N., R. 2 E., near southwest corner of SW. $\frac{1}{4}$ sec. 26, on road from Roberts-ville to Grubville, at fork to Catawissa; iron post stamped "787".....	787. 98

## Washington County.

Richwoods post office, near center of south side of crossroads, in root of walnut tree; nail.....	823. 470
T. 40 N., R. 1 E., NW. $\frac{1}{4}$ sec. 23, 50 yards west of road from Richwoods down Indian Creek and 75 yards east of Flannigan's house, in ledge of rock on west bank of Little Indian Creek; copper bolt stamped "637".....	637. 719
Hulsey post office, 80 feet east of, near northwest corner of SW. $\frac{1}{4}$ sec. 36, T. 40 N., R. 1 W., in rock; copper bolt stamped "631".....	632. 543
T. 39 N., R. 1 W., near southeast corner of NE. $\frac{1}{4}$ sec. 22, 60 feet northeast of barn on J. B. Muerhaney's farm, in flat rock; copper bolt stamped "761".....	762. 306
T. 38 N., R. 1 W., near southwest corner of NW. $\frac{1}{4}$ sec. 1, 40 feet south of J. W. Boyd's house, in rock; copper bolt stamped "830".....	831. 313
Troutt post office, northeast of, near northeast corner of sec. 35, T. 39 N., R. 1 E., at forks in roads, in rock; copper bolt stamped "1079".....	1, 081. 872
Richwoods post office, 2 miles south of, on road from Richwoods to Old Mines, in crossroads; iron post stamped "851".....	852. 997
Fourche a Renault post office, 250 feet west of, near center of sec. 13, T. 38 N., R. 1 E., near big spring; iron post stamped "709".....	710. 245
Old Mines post office, north end of lower step at gate to Catholic Church; copper bolt stamped "820".....	820. 729
T. 38 N., R. 3 E., SE. $\frac{1}{4}$ sec. 4, at fork in road to Fillmore, 2.5 miles southwest of Fertile post office, in sandstone rock on east side of road from Fertile to Old Mines; copper bolt stamped "913".....	913. 991
Fertile post office, 60 feet south of, sec. 27, T. 39 N., R. 3 E., side of top step of doorsill at Higginbotham's house; bronze tablet stamped "763".....	764. 460
T. 38 N., R. 4 E., NE. $\frac{1}{4}$ sec. 7, north abutment of St. Louis, Iron Mountain & Southern R. R. bridge 46, 0.8 mile south of Blackwell station; copper bolt stamped "594".....	594. 910

## Berryman, Bonnetterre, Crystal City, Farmington, and Potosi Quadrangles.

## JEFFERSON, ST. FRANCOIS, STE. GENEVIEVE, AND WASHINGTON COUNTIES.

The elevations in the following list are based on the Mississippi River Commission bench mark "45/3" at Riverside, which is situated 2,378 feet (725 meters) south of the station, on the north bank of the second creek below the station, 114.8 feet (35 meters) from the river shore, on land of Mr. Parsons. The bench mark is a stone post under a sycamore tree; its elevation by the 1907 adjustment is 401.524 feet above mean sea level.

The leveling was done in 1903 and 1904 by D. V. Vandiver.

## CRYSTAL CITY QUADRANGLE.

Riverside southwest along Mississippi River & Bonne Terre Ry. to Valles Mines (double-rodged line).

Riverside, 2,378 feet south of station (Mississippi River Commission bench mark), on north bank of second creek below station, 114.8 feet from Mississippi River shore, on land of Mr. Parsons; stone post set under sycamore tree.....	Feet. 401. 524
Herculaneum, on northwest stone pier of stone bridge; cross.....	409. 62
Genevieve, northeast side of station, east of railroad; chisel mark on ledge of sandstone.....	444. 60
Valles Mines, 45 feet southwest of station; iron post stamped "745".....	746. 084

## BONNETERRE QUADRANGLE.

Valles Mines south along Mississippi River & Bonne Terre Ry. to Bonne Terre (single line).

Silver Springs, in northwest abutment of stone of trestle 38, 300 feet north of station; aluminum tablet stamped "824".....	825. 813
Bonneterre, on southeast corner of station platform.....	829. 77

Bonneterre south along Mississippi River & Bonne Terre Ry. to Elvins.

Bonneterre, in east face of southeast corner of foundation of station; bronze tablet stamped "829".....	830. 248
Bonneterre, in front of foundation of Farmers and Miners Bank; aluminum tablet stamped "824".....	825. 810
Elvins, in southeast corner of foundation of white building 40 feet west of tracks; aluminum tablet stamped "765".....	766. 347

Bonneterre west along Chat Road to Hopewell; thence southwest to Bismarck; thence along St. Louis, Iron Mountain & Southern Ry. to Doe Run Junction; thence along Mississippi River & Bonne Terre Ry. to Elvins; thence west along Illinois Southern Ry. to Bismarck.

Bonneterre, 3.5 miles west of, on Chat Road, 300 feet north of spring, 100 feet from fork, in ledge of stone at forks; bronze tablet stamped "905".....	906. 817
Hopewell, 600 feet west of railroad track, 300 feet south of post office, in foundation of stone surrounding big spring; aluminum tablet stamped "858".....	859. 018
Irondale, in column stone of Irondale Bank, right of entrance; aluminum tablet stamped "810".....	811. 293
Bismarck, in front of Bismarck Bank, left of entrance; aluminum tablet stamped "1028".....	1, 029. 855

Bonneterre northwest along highway to Cadet; thence southwest along St. Louis, Iron Mountain & Southern Ry. to Mineral Point; thence along highway south to Hopewell.

Bonneterre, 6.5 miles west of, 30 feet above ford of Three Hills Creek, on east side, 4 feet above edge of water, in ledge of stone; bronze tablet stamped "678".....	679. 676
Mineral Point, 600 feet south of station, in southeast abutment stone of bridge over Mill Creek; bronze tablet stamped "854".....	855. 145

Hopewell south along highway to Caledonia, thence east to Bismarck.

Caledonia, in front of Methodist Church, in large sandstone step; aluminum tablet stamped "923".....	924. 411
Irondale, 4.5 miles southwest of, 90 feet southwest of forks, on top of hill, in flint stone; bronze tablet stamped "1104".....	1, 105. 581

**FARMINGTON QUADRANGLE.**

**Elvins east along Illinois Southern Ry. via Farmington Junction to Weingarten.**

Elvins, in foundation stone at southeast corner of white building 40 feet west of the Mississippi River & Bonne Terre Ry. tracks; aluminum tablet stamped "765".....	Feet. 766.347
Farmington Junction, in southeast corner of foundation of station; bronze tablet stamped "955".....	956.489

**Plank road crossing near Jonca Creek (on Illinois Southern Ry.) southwest via Farmington to Doe Run Junction.**

Jonca Creek, 2.5 miles south of railroad crossing plank road, in northeast corner abutment stone of iron bridge; aluminum tablet stamped "760".....	760.951
Valley Forge, in northeast corner abutment stone of Wolf Creek bridge; bronze tablet stamped "853".....	853.888
Farmington, in south front of foundation of courthouse, west side of entrance; aluminum tablet stamped "917".....	918.641

**Crossing 2 miles west of Sprott (on Illinois Southern Ry.) north along highway to Jaydee post office, thence west to Bonneterre.**

Salem Church, in southwest corner of stone foundation; bronze tablet stamped "834".....	835.051
Jaydee post office, opposite, in southeast corner of foundation of N. Chatman's house; bronze tablet stamped "804".....	805.368
Bonneterre, Farmers and Miners Bank, in foundation stone; aluminum tablet stamped "824".....	825.809

**Plank road fork 5 miles east of Farmington east to Oak Grove schoolhouse, thence northeast and northwest to plank road crossing at 17-mile Rock.**

Pickle, 0.9 mile east of, northeast corner of Oak Grove schoolhouse; bronze tablet stamped "1053".....	1,053.725
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**Hickory Creek northwest along road via Lawrenceton to French Village, thence south to Jaydee.**

Lawrenceton, 250 feet west of church, 100 feet north of road, in limestone outcrop in small branch; aluminum tablet stamped "561 ADJ 1903"....	562.076
French Village, in southeast corner of foundation of spring house; bronze tablet stamped "898".....	899.392

**POTOSI QUADRANGLE.**

**Mineral Point west along highway to Potosi, thence northwest to Pleasant Grove, thence north to Fourche a Renault.**

Potosi, in south foundation of courthouse, 5 feet west of front door, 3.5 feet above ground; aluminum tablet stamped "904 ADJ 1903".....	905.065
Pleasant Hill (Grove) church, in southeast corner of foundation stone, 1.5 feet above ground; aluminum tablet stamped "816 ADJ 1903".....	817.829

**Pleasant Grove west along highway to Little Pilot Knob, thence southeast to Belgrade, thence east to Caledonia, thence north to Potosi.**

Latty, 1.4 miles southwest of, 1,000 feet west of Fourche a Renault Creek, 70 feet west of spring house, opposite Henry Smith's house, in ledge of natural stone; aluminum tablet stamped "Prim. Trav. Sta. No. 79, 790 ADJ 1903".....	791.122
Floyd, 2.5 miles northwest of, 1 mile southwest of Knob, Little Pilot Knob primary traverse station No. 167, in large porphyry bowlder; aluminum tablet stamped "1243 ADJ 1903".....	1,244.150

Floyd post office, in east foundation stone of Earles's house, 4 feet west of corner of front porch; aluminum tablet stamped "877 ADJ 1903".....	Feet. 878.422
Shirley, 300 feet southwest of store, 150 feet east of Berryman Road, at northwest corner of barn, in natural sandstone bowlder; aluminum tablet stamped "941 ADJ 1903".....	941.751
Potosi, 8 miles southwest of, 1,500 feet east of lead company's barn, 400 feet west of Gibson's house, 100 feet west of road, 300 feet north of Baptist Church, in limestone ledge; aluminum tablet stamped "1004 ADJ 1903".	1,004.969
Belgrade, 3 miles north of, 80 feet northeast of Johnson's house, 100 feet northwest of ford, north side of north fork of Clear Creek; iron post stamped "912 ADJ 1903".....	913.356
Belgrade, 1.5 miles east of, 3 miles west of Caledonia, on east bank of small branch, in large porphyry stone; aluminum tablet stamped "923 ADJ 1903".....	924.015
Caledonia, in south stone step, front entrance of Methodist Church; aluminum tablet stamped "923 ADJ 1903".....	924.411
Caledonia, 3 miles north of, 300 feet east of crossing of Belgrade-Irondale and Caledonia-Potosi roads, 200 feet west of Newcomb's blacksmith shop, in limestone ledge; aluminum tablet stamped "821 ADJ 1903".....	822.479
Potosi, 5 miles south of, 1,000 feet south of Pine Hill, 3 feet west of road, in sandstone bowlder; aluminum tablet stamped "1110 ADJ 1903".....	1,111.796
<b>Floyd post office south along highway via Palmer to Crystal Blossom store, thence east to Belgrade.</b>	
Levy, 1 mile east of, in southwest corner of foundation stone of Lost Creek Baptist Church, 2.5 feet above ground; aluminum tablet stamped "924 ADJ 1903".....	925.014
Palmer, 4 miles north of, in sandstone bowlder where two trails fork; aluminum tablet stamped "Prim. Trav. Sta. No. 217 1,002 ADJ 1903".....	1,002.988
Palmer, in southwest corner of foundation stone of post office, 5 feet above ground; aluminum tablet stamped "900 ADJ 1903".....	901.683
Sunlight, 4 miles west of, near Crystal Blossom store, 7 feet above good spring which runs out across road 500 feet east of house; aluminum tablet stamped "1021 ADJ 1903".....	1,022.135
Sunlight, 0.25 mile south of, in southeast corner of stone foundation of Ramsey Grove Church, 300 feet south of Brock Creek; aluminum tablet stamped "988 ADJ 1903".....	989.603
Belgrade, 1.5 miles west of, 2 miles east of Sunlight, south side of Brock Creek, 2 feet above water, in ledge; aluminum tablet stamped "904 ADJ 1903".	905.078

**BERRYMAN QUADRANGLE.**

Palmer, 3.5 miles southwest of, in flint and limestone bowlder; aluminum tablet stamped "Prim. Trav. Sta. No. 394 1164 ADJ 1903".....	1,165.578
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**Sullivan Quadrangle.****CRAWFORD, FRANKLIN, GASCONADE, AND WASHINGTON COUNTIES.**

The elevations in the following list are based on the St. Louis city directrix, the elevation of which is accepted as 413.968 feet above mean sea level by the 1907 adjustment.

The leveling was done by Jesse L. Holman and H. V. Rees, in 1899.

Owing to excessive errors in closure of circuits the elevations in this list are only approximate, excepting for those bench marks along

the St. Louis & San Francisco Railroad included in the precise level line of 1908.

# SULLIVAN QUADRANGLE.

	Feet.
Union; cross mark on northwest corner of stone steps of courthouse.....	567. 72
Krakow, NE. $\frac{1}{4}$ sec. 8, T. 43 N., R. 1 W., 100 feet northwest of post office; copper nail in root of oak tree.....	764. 15
Casco, NE. $\frac{1}{4}$ sec. 17, T. 43 N., R. 2 W., in northwest corner of foundation of former post-office building; aluminum tablet stamped "St. L. 781"...	782. 136
Jeffriesburg, SE. $\frac{1}{4}$ sec. 25, T. 43 N., R. 2 W., 100 feet southeast of post office; cross mark on large rock.....	767. 39
Cedar Fork, NE. $\frac{1}{4}$ sec. 19, T. 43 N., R. 3 E., 300 feet west of former post office; nail in root of oak tree.....	812. 09
Port Hudson, SW. $\frac{1}{4}$ sec. 22, T. 43 N., R. 3 W., 1 mile south of former post office, in foundation of store building at crossroads; aluminum tablet stamped "St. L. 867".....	868. 318
Beemont, NE. $\frac{1}{4}$ sec. 23, T. 43 N., R. 4 W., 2.5 miles southeast of post office, in sandstone ledge on State road; aluminum tablet stamped "St. L. 795".....	795. 82
Drake, SE. $\frac{1}{4}$ sec. 10, T. 43 N., R. 5 W., in foundation of post-office building; aluminum tablet stamped "St. L. 868".....	869. 034
Neirer, NE. $\frac{1}{4}$ sec. 14, T. 42 N., R. 2 W., on bottom step of former post-office building; cross mark.....	821. 343
Shotwell, near center of sec. 7, T. 42 N., R. 3 W., in foundation of former post-office building; aluminum tablet stamped "St. L. 855".....	855. 614
Bourbois, NE. $\frac{1}{4}$ sec. 17, T. 42 N., R. 4 W., one-fourth mile west of post office, in foundation of Wortmann's stone building on Springfield Road; aluminum tablet stamped "St. L. 897".....	897. 62
T. 42 N., R. 5 W., SE. $\frac{1}{4}$ sec. 23, in foundation of frame house on Springfield road owned by Mr. Holt; aluminum tablet stamped "St. L. 921"...	921. 755
Stanton, near St. Louis & San Francisco R. R. station, in foundation of hotel building; aluminum tablet stamped "St. L. 872".....	872. 25
Japan, 3 miles north of, NE. $\frac{1}{4}$ sec. 19, at northeast corner of junction of crossroads, on main road to Champion City; iron post stamped "St. L. 778".....	779. 178
Tea, SW. $\frac{1}{4}$ sec. 8, T. 41 N., R. 4 W., in foundation of T. H. Mathews' store building; aluminum tablet stamped "St. L. 740".....	740. 887
Bem, near center of sec. 27, T. 41 N., R. 5 W., in yard of post-office building; iron post stamped "St. L. 833".....	834. 041
Sullivan, near St. Louis & San Francisco R. R. station, in wall of Bennett building; aluminum tablet stamped "St. L. 977".....	976. 715
Bourbon, near St. Louis & San Francisco R. R. station, in foundation of brick hotel building; aluminum tablet stamped "St. L. 954".....	954. 502
Oak Hill, NW. $\frac{1}{4}$ sec. 18, T. 40 N., R. 4 W., in foundation of post-office building; aluminum tablet stamped "St. L. 749".....	750. 395
Oak Hill, 3.2 miles southeast of, NW. $\frac{1}{4}$ sec. 22, T. 40 N., R. 5 W., at crossroads on Oak Hill and Jake Prairie Road; iron post stamped "St. L. 964"...	965. 041
Vilander, NE. $\frac{1}{4}$ sec. 15, T. 39 N., R. 2 W., 160 yards east of post office, south side of county road; iron post stamped "St. L. 638".....	638. 363
Leasburg, near the St. Louis & San Francisco R. R. station, in foundation of Exchange Hotel building; aluminum tablet stamped "St. L. 1023"...	1,024. 87
Cuba, near the St. Louis & San Francisco R. R. tracks, in foundation of Grand Hotel building; aluminum tablet stamped "St. L. 1033".....	1,035. 244

Jacobston, 0.1 mile west of post office, NW. $\frac{1}{4}$ sec. 12, T. 39 N., R. 5 W., in rock bluff 30 feet south of Cuba and Jake Prairie Road; aluminum tablet stamped "St. L. 852".....	Feet. 852. 829
T. 38 N., R. 2 W., NW. $\frac{1}{4}$ sec. 5, at north edge of road, 50 yards west of foundation of Mudd's store building on road from Anthonies Mill to Scotia; iron post stamped "St. L. 868".....	868. 434
Scotia, 0.2 mile northeast of post office, NE. $\frac{1}{4}$ sec. 11, T. 38 N., R. 3 W., in limestone bluff at north edge of road to Anthonies Mill; aluminum tablet stamped "St. L. 644".....	644. 945
T. 38 N., R. 4 W., SW. $\frac{1}{4}$ sec. 5, 1.8 miles south of Cuba, 25 feet east of St. Louis & San Francisco R. R. track, at road crossing; iron post stamped "St. L. 966".....	967. 204
Fanning, SE. $\frac{1}{4}$ sec. 4, T. 38 N., R. 5 W., 15 feet west of platform of St. Louis & San Francisco R. R. station, 10 feet south of track; iron post stamped "St. L. 1059".....	1,060. 545

**Chester (Ill.), Higdon, and Weingarten Quadrangles.**

**BOLLINGER, MADISON, PERRY, AND STE. GENEVIEVE COUNTIES.**

The elevations in the following list are based upon Mississippi River Commission bench marks at Ste. Genevieve and at St. Marys, and upon 1907 adjustment datum.

Most of the leveling was done in 1907 by Edward Bandli. One bench mark on Weingarten quadrangle was established in 1903 by D. V. Vandiver.

The leveling was done in cooperation with the State, and the bench marks are stamped with the State name. There is doubt as to the marking of some of the bench marks.

**WEINGARTEN QUADRANGLE.**

**Ste. Genevieve west along Potosi Road via Zell to point 5.5 miles west of Zell, thence south to Weingarten.**

Ste. Genevieve, permanent bench mark 33, in side at southeast corner of public school building, 4 inches from corner in fifth course of stone, center of copper bolt leaded horizontally (the letters "U.S.P.B.M." are cut near bolt).....	Feet. 400. 999
Ste. Genevieve, 3.9 miles west of, 300 feet east of forks of road, in large ledge forming south bank of dry creek at forks of Potosi and St. Louis Roads, 100 feet south of road across dry creek; aluminum tablet stamped "476".....	476. 758
Zell, 500 feet north of, at first intersection north of Zell, in rock between two trees opposite road fork; aluminum tablet stamped "614".....	613. 897
Zell, 2.7 miles northwest of, 15 feet north of road, top of hill, 3 feet south of fence, in large sandstone ledge; aluminum tablet stamped "607".....	609. 765
Weingarten, 5 miles north of, 20 feet east of fence, 300 feet south of T road, 5 feet west of road, in ledge of rock; aluminum tablet stamped "587".....	587. 662
Weingarten, 2.7 miles north of, 30 feet east of T road, 20 feet east of southeast fence corner where oak stands, 0.12 mile from Mr. Repson's house; private road leads to his house; iron post stamped "767".....	770. 292
Weingarten, in concrete foundation of Illinois Southern Ry. water tank foundation, southwest corner of; aluminum tablet stamped "833".....	833. 316



**Weingarten northwest to Hickory Creek.**

Weingarten, 4.5 miles northwest of, at Hickory Creek ford on Lawrenceville Road, south side of creek, 50 feet south of road, 200 feet southwest of old sawmill, in limestone bluff; bronze tablet stamped "503".....	Feet. 504. 813
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**Weingarten east along road to Staabtown, thence south to Coffman, thence east to Minnith, thence northeast to point 6 miles southwest of St. Marys.**

Weingarten, 2.4 miles from, 30 feet south of curve of road to east, 0.1 mile from Brischle house, on ledge of rock on opposite side of dry creek from road; aluminum tablet stamped "606".....	606. 162
Staabtown, 0.8 mile north of, in front of church, 15 feet south of road leading from church to Weingarten, in ledge of rock; aluminum tablet stamped "475".....	475. 177
Staabtown, 3.3 miles from, on road to Coffman, 0.2 mile northeast from house and old blacksmith shop, in large rock at intersection of another road from southwest; aluminum tablet stamped "886".....	885. 726
Staabtown, 5.2 miles south from, 3 miles north of Coffman, on north side of road, north 0.4 mile from house on north side of hill, 200 feet from intersection of roads to northwest, 60 feet from intersection of roads to southeast; aluminum tablet stamped "947".....	946. 485
Coffman, 0.5 mile from, 33 feet north of road, 15 feet south of fence, in ledge of rock at foot of hill; aluminum tablet stamped "715".....	715. 445
Coffman, 3.2 miles east of, near Saline Valley R. R. track, 250 feet northeast of road crossing, 60 feet north of road, in ledge of rock; aluminum tablet stamped "558".....	563. 665
Coffman, 7.1 miles east of, 100 feet north of Saline Valley R. R. track and 140 feet west of road, 180 feet northwest of road crossing, in ledge of rock; aluminum tablet stamped "448".....	467. 464
Minnith, 960 feet south of, 22 feet east of Saline Valley R. R. track, in ledge of rock 4 feet from cedar tree; aluminum tablet stamped "437".....	437. 265
Minnith, 1.2 miles from, opposite overhead railroad bridge on private road to northwest, 18 feet southeast of St. Marys Road, 300 feet south of curve of road to east toward St. Marys, 8 feet south of large oak tree; aluminum tablet stamped "416".....	417. 471
St. Marys, 6 miles southwest of, on north side of road near valley leading north from road, in ledge of rock; aluminum tablet stamped "482".....	485. 473

**Saline Valley south to point near Ulan.**

Womack, 7.8 miles from, 2.1 miles from railroad, 36 feet south of gate, 3 feet east of fence; iron post stamped "Prim. Trav. Sta. No. 9, 528".....	527. 978
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**HIGDON QUADRANGLE.****Minnith south along road via Silver Lake to Patton, thence west to Castor River, thence north to point near Higdon, thence west to point near Fredericktown, thence northeast to point near Ulan.**

Minnith, 6.3 miles south of, 7.7 miles northwest of Silver Lake, halfway up hill, west side of road where road curves to south, 20 feet west of road, 5.4 feet southeast of large oak west of road, in ledge of rock; aluminum tablet stamped "650".....	650. 406
Silver Lake, 5.6 miles north of, 8.4 miles south of Minnith, near signpost at forks of road, in root of tree; nail.....	846. 06
Silver Lake, 1.8 miles northwest of, 20 feet north of public road, 10 feet west of private road, in northwest corner of intersection, on ledge of rock north of road; aluminum tablet stamped "608".....	608. 008

Silver Lake, 0.6 mile south of, 400 feet from center of crossroads, 25 feet east of bunch of trees, 15 feet north of a second bunch of trees, in ledge of rock across small stream from road intersection; aluminum tablet stamped "545".....	Feet. 544. 648
T. 34 N., R. 9 E., near center of sec. 14. Tucker's house, 0.1 mile northeast of, 200 feet south of creek, 10 feet from road, 6 feet north of large oak, in ledge of sandstone 3.5 feet northeast of small tree east of road; aluminum tablet stamped "607".....	606. 565
Silver Lake, 6.9 miles south of, 0.1 mile south of Yount post office, northwest corner of crossroads, in root of tree; nail.....	627. 01
Yount post office, 1.3 miles from, 0.25 mile from Yount's house, 220 feet west of intersection of private road with Fredericktown Road, in ledge of rock opposite side of creek from road; aluminum tablet stamped "609".....	610. 380
Patton, 4.2 miles from, 0.1 mile southeast of George Regan's house, 30 feet southeast of bridge, 10 feet east of road; aluminum tablet stamped "700".....	700. 400
Patton, southeast corner of flour mill, in third layer of stone from ground, west side of Main Street; aluminum tablet stamped "Prim. Trav. Sta. No. 8, 605".....	604. 998
Patton, 2.3 miles from, 300 feet north of road, 90 feet east from spring flowing from ledge of rock, 200 feet north of Schneider's house at private road intersection with Fredericktown Road; aluminum tablet stamped "639".....	640. 978
Patton, 5.2 miles northwest of, 55 feet west of northwest corner of T road intersection from north, 13 feet south of fence, in large sandstone; aluminum tablet stamped "939".....	939. 207
Patton, 8.1 miles from, 20 feet north of road, 50 feet northwest of northwest corner of field, where road leaves field, in ledge of rock north of road; aluminum tablet stamped "691".....	691. 393
Patton, 10.4 miles from, 20 feet east of road at curve uphill to west, in ledge of rock, 300 feet southeast of house; aluminum tablet stamped "686".....	685. 862
Higdon, 2.5 miles southwest of, 4.6 miles from Fredericktown, 10 feet north of road, near top of hill, 0.25 mile west from house at forks of road, also 0.25 mile east of house on top of hill, in granite ledge; aluminum tablet stamped "910".....	910. 423
Fredericktown, 3 miles northeast from, 20 feet north of road, 0.12 mile west of Freeland's house, at foot of first small hill west of house, in ledge of rock; aluminum tablet stamped "855".....	855. 046
Womack, 6.9 miles from, 200 feet north of intersection, 30 feet east of road, in northeast corner of road intersection, east of road; large rock.....	1, 063. 94
Womack, 4.4 miles south of, 30 feet north of dry creek, 0.5 mile east of Rydan's house, 3 feet north of road, on large boulder; aluminum tablet stamped "949".....	949. 052
Womack, 2.6 miles south of, 1.5 miles north of Hicks, 4.5 feet west of road up Castor, west of road at bend, in large granite boulder; aluminum tablet stamped "966".....	965. 503
Johnson, on ridge, 0.4 mile north of, 60 feet north of road, in large boulder in hill across dry creek from road, where road curves to east foot of hill; aluminum tablet stamped "927".....	926. 732
Womack, 4 miles from, 0.25 mile from house of Mr. Nation, jr., in ledge on opposite bank of Cold Water Creek from road, 60 feet east from road; aluminum tablet stamped "694".....	694. 200
Womack, 6.8 miles northeast of, 3 miles from Saline Valley R. R., in west bank of creek, 120 feet west of road, across Cold Water Creek, north of road intersection; aluminum tablet stamped "557".....	557. 227

**CHESTER QUADRANGLE.<sup>1</sup>****Point 6 miles southwest of St. Marys northeast to St. Marys.**

St. Marys, 4.5 miles from, halfway between houses near foot and near top of hill, about 30 feet south of road near edge of bluff, 11 feet southwest of large tree, in ledge of rock on hill; aluminum tablet stamped "466".....	Feet. 468. 049
St. Marys, in west end of water table in southwest corner of storehouse belonging to E. S. Tundaugh on northeast corner of Second Walnut Street; copper bolt countersunk about 0.2 inch (5 mm.) in stone, center of bolt leaded horizontally (Mississippi River Commission bench mark No. 35, marked "U. S. P. B. M.").....	389. 015
St. Marys, in southwest corner of Martin Roundstone's icehouse, on east side of Walnut Street, in fifth course of stone from bottom; center of copper bolt leaded horizontally (Mississippi River Commission bench mark No. 36, stone marked "U. S. B. M.").....	395. 961

**Condray, Edgar Springs, Franks, and Rolla Quadrangles.****DENT AND PHELPS COUNTIES.**

The elevations in the following list are based upon a precise level line run in 1908 by E. L. McNair from the United States Army Engineers' bench mark at Labadie, the accepted elevation of which, by 1907 adjustment, is 472.692 feet.

The leveling was done in 1908 and 1909 by C. H. Swift.

**ROLLA QUADRANGLE.****Rolla south 9 miles.**

Rolla, three blocks north of Grant Hotel, east side of street, in B. L. Knapp's yard; iron post stamped "1130".....	Feet. 1, 129. 566
Rolla, 1.1 miles southeast of, on Lecoma Road, road fork to northeast, in root of 16-inch black oak tree; nail marked "1107.30".....	1, 097. 11
Rolla, 6.6 miles southeast of, on Lecoma Road, 30 feet west of corner secs. 1, 6, 7, 12, T. 36 N., Rs. 7 and 8, in stone; aluminum tablet stamped "Trav. Sta. No. 8, 1173".....	1, 172. 794
Rolla, 8.1 miles southeast of, on Lecoma Road, dim crossroads, in root of 18-inch black oak tree 15 feet west of road; nail marked "1240.6".....	1, 230. 50

**Lecoma southwest 5 miles.**

Lecoma, 3 miles south of, at fork of road to south, in root of black-oak tree; nail.....	1, 148. 58
Lecoma, 4.3 miles southwest of, on Lecoma and Edgar Springs Road, T road south, in root of 18-inch post-oak tree; nail marked "1129.4".....	1, 119. 30

**Point 3 miles northwest of Flat post office to point 6.4 miles northwest.**

Flat post office 3 miles northwest of, 200 feet southwest of B. M. Hartung's barn, also 200 feet west of road, north of small ravine, in sandstone ledge; aluminum tablet stamped "1092".....	1, 092. 259
Flat post office, 5.8 miles northwest of, 725 feet north of lane running east to Joiner's house, 40 feet east of road and 2 feet west of rail fence, in sandstone rock 24 by 24 inches, in ravine; aluminum tablet stamped "1086.4".....	1, 086. 408

<sup>1</sup> Only the Missouri elevations for this quadrangle, a part of which is in Illinois, are given here.

Flat post office, 6.4 miles northwest of, plain road fork to south known as Arlington and Spring Creek Road, signboard "3.5 miles to Spring Creek," 10 feet west of road, in root of 20-inch black-oak tree; nail marked "1119.6" .....	Feet. 1, 109.58
<b>Clementine northeast to rail oad bridge over Gasconade River.</b>	
Arlington, 1.4 miles south of, 300 feet south of small graveyard, 50 feet east of road, in sandstone ledge; aluminum tablet stamped "779" .....	778.882
Arlington, in east pier of railroad bridge across Gasconade River; aluminum tablet stamped "687" .....	686.773
<b>Arlington north and east along highways via Gatchel and Oak Grove schoolhouse to Rolla.</b>	
Arlington, 1.2 miles northeast of, dim road fork to north, 15 feet south of road, in root of 10-inch sycamore tree; nail marked "684" .....	684.15
Arlington, 3.9 miles northeast of, in southwest corner of foundation of Gatchel schoolhouse; aluminum tablet stamped "973" .....	973.170
Wellington, 4.5 miles northeast of, road fork north known as Brickhouse Ford Road, 10 feet southeast of road, in root of 12-inch black-oak tree; nail marked "1002.3" .....	1, 002.40
Arlington, 6.4 miles northeast of, 565 feet southwest of center of sec. 33, T. 28 N., R. 9 W., in sandstone ledge jutting out of point of ridge; aluminum tablet stamped "908" .....	907.639
Arlington, 9.4 miles northeast of, 2 feet north by 6 feet east of northwest corner of Oak Grove schoolhouse, in sandstone jutting out of ground; aluminum tablet stamped "1006" .....	1, 006.092
Rolla, 5.4 miles northwest of, road fork south at R. A. Collyer's mail box, 5 feet south of road, in root of 10-inch post-oak tree; nail marked "1109" .....	1, 109.439
Rolla, 3.9 miles northwest of, 1,500 feet west of north fork of Beaver Creek, 15 feet south of road, in sandstone ledge; aluminum tablet stamped "1013" .....	1, 013.060

## CONDRAV QUADRANGLE.

Point 2.5 miles north of Lecomma to point 2.5 miles southwest of Lecomma.

Rolla, 9 miles southeast of, on Lecomma Road, in sandstone ledge 20 feet east of road, at southwest corner of Will Carson's farm; aluminum tablet stamped "1170" .....	1, 170.319
Lecomma, 1.4 miles north of, on Rolla and Lecomma Road, in root of 14-inch post-oak tree at camp; nail marked "1151.9" .....	1, 141.81
Lecomma, in southeast corner of flour mill; aluminum tablet stamped "1197" .....	1, 196.703
Lecomma, 0.3 mile south of, on Lecomma and Edgar Springs Road, road fork to south, line on ridge road southwest, in root of 12-inch post-oak tree; nail marked "1214.8" .....	1, 204.65
Lecomma, 1 mile southwest of, on Lecomma and Edgar Springs Road, 10 feet south of road, dim crossroads, in root of 12-inch black-oak tree; nail marked "1186.8" .....	1, 176.66
Lecomma, 2 miles southwest of, on Lecomma and Edgar Springs Road, in south side of T road north, east of S. L. Amerson's place, in sandstone rock, 24 by 8 by 5 inches; aluminum tablet stamped "Prim. Trav. Sta. No. 7, 1173" .....	1, 172.974

At point 3.1 miles southeast of Rolla.

Rolla, 3.1 miles southeast of, on Lecomma Road, in front of vacant house, 15 feet west of road; iron post stamped "1073" .....	1, 073.382
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**EDGAR SPRINGS QUADRANGLE.**

*Junction of Horse Creek and Little Piney River to point 3 miles west of Flat.*

Lecoma, 5 miles southwest of, on Lecoma and Edgar Springs Road, sec. 21, T. 35 N., R. 8, W. 400 feet southwest of 40-acre corner, 0.3 mile south of northeast corner sec. 21, in sandstone ledge 10 feet north of road; aluminum tablet stamped "1061".....	Feet. 1, 061. 021
Lecoma, 6.8 miles southwest of, on Lecoma and Edgar Springs Road, road fork to south, first road fork west of Little Piney River, on 14-inch post-oak tree, in root; nail marked "1146.5".....	1, 136. 47
Lecoma, 7.3 miles southwest of, on Lecoma and Edgar Springs Road, road fork to north known as Yancy Mill Road, in root of 18-inch black-oak tree; nail marked "1171.8".....	1, 161. 72
Lecoma, 8.7 miles southwest of, on Lecoma and Edgar Springs Road, dim crossroad running north-south, in root of 16-inch post-oak tree; nail marked "1204.1".....	1, 194. 08
Lecoma, 9.3 miles southwest of, where Lecoma and Edgar Springs and Houston Road forks, 600 feet south of northeast corner of NW. $\frac{1}{4}$ sec. 30, T. 35 N., R. 8 W., 100 feet northwest of T road west, 10 feet north of small ravine, in sandstone ledge; aluminum tablet stamped "1153".....	1, 153. 438
Houston Road, 1.7 miles west of, 2,000 feet east of Avert Jenkin's residence in top of large sandstone jutting in Corn Creek at ford near fork, in center of stone 10 by 5 feet; aluminum tablet stamped "1057".....	1, 057. 083
Flat post office, 1.2 miles east of, road fork to north known as Edgar Springs and Newburg Road, in root of post-oak tree 10 inches in diameter; nail marked "1145.3".....	1, 135. 31
Flat post office, 0.4 mile southwest of, on Relfe Road, in sandstone ledge 10 feet east of, 150 feet north of road fork, head waters of Mill Creek; aluminum tablet stamped "1116".....	1, 116. 294
Flat post office, 0.9 mile west of, on ridge road to Arlington, road fork to south, 300 feet west of vacant log house known as Main Hotel, in root of 12-inch white-oak tree; nail marked "1175.6".....	1, 165. 60

**FRANKS QUADRANGLE.****Clementine.**

Clementine post office, 0.8 mile south of, road fork to right, in root of post-oak tree at small white house; nail.....	1, 072. 52
Clementine post office, at T road west, 40 feet south by 30 feet west to quarter corner between secs. 3 and 10, T. 36 N., R. 10 W., in sandstone 30 by 14 by 8 inches; aluminum tablet stamped "Prim. Trav. Sta. No. 4, 1058".....	1, 058. 165
Clementine post office, 1 mile northwest of, road fork to east at northwest corner of Slaughter's fence, in root of 18-inch black-oak tree; nail marked "1033.7".....	1, 023. 72

**Eldon and Gravois Mills Quadrangles.****MONITEAU, MORGAN, AND MILLER COUNTIES.**

The elevations in the following list are based upon an aluminum tablet stamped "1037 VRSLs" in the foundation at the southwest corner of the courthouse at Versailles, the elevation of which is accepted as 1,037.088 feet above mean sea level. The initial points upon which this leveling depends are the triangulation stations "Hunter" and "North Base" of the Coast and Geodetic Survey,

which are also bench marks on a spur line of its transcontinental precise-level line. The elevations are by the 1907 adjustment.

The leveling was done in 1902 by O. Laurgaard.

#### GRAVOIS MILLS QUADRANGLE.

##### Hunter triangulation station along road to north base triangulation station.

	Feet.
Hunter triangulation station (Coast and Geodetic Survey), 4 miles east of Versailles, in surface stone marking station; top of copper bolt.....	1,048.495
Versailles, on southwest corner of foundation of courthouse; aluminum tablet stamped "1037 VRSLs".....	1,037.088
Versailles, 3.5 miles north of, about 300 feet west of bridge 23, in Moreau Creek, on flat stone; aluminum tablet stamped "903 VRSLs".....	903.462
Versailles (North Base of the Coast and Geodetic Survey) triangulation station and bench mark.....	1,057.768

##### Hunter via Versailles to Gravois Mills.

Gravois Creek, branch of, 150 paces south of McDaniel's house, 57 paces west of road, on north edge of creek; aluminum tablet stamped "818 VRSLs" (set in rock).....	817.632
Huhn's store, 1 mile west of, 15 paces northwest of road, in projecting rock beneath an 8-inch tree; bronze tablet stamped "719 VRSLs".....	719.514

##### Gravois Mills to Gladstone.

Gravois Mills, in foundation of J. T. Washburn's store; aluminum tablet stamped "673 VRSLs".....	672.953
Gladstone, in foundation of Seydebothan's Hotel; aluminum tablet stamped "614 VRSLs".....	614.453

##### At Proctor. Single Spur line.

Proctor, in front of Talbot's house, in foundation; bronze tablet stamped "652 VRSLs".....	651.848
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#### ELDON QUADRANGLE.

##### Rocky Mount via Barnett to Hunter.

Rocky Mount, opposite post office, in foundation of church; bronze tablet stamped "996 VRSLs".....	996.305
Barnett, in front of Beckman's store, in foundation of church; aluminum tablet stamped "917 VRSLs".....	916.978

##### Versailles (North Base) via Olean and Eldon to Rocky Mount.

Excelsior, east of, 50 paces south of road, in creek bed, in large flat rock; bronze tablet stamped "863 VRSLs".....	862.661
High Point, in brick front of Tising's store; bronze tablet stamped "904 VRSLs".....	903.989
Olean, in brick front of Dr. Allees's drug store; aluminum tablet stamped "770 VRSLs".....	770.257
Eldon, in brick front of bank; aluminum tablet stamped "934 VRSLs".....	934.218

##### Eldon to Bagnell and return.

Bagnell, 170 yards northwest of station, 7 yards southeast of switch, 4 paces north of track, in rock; bronze tablet stamped "587 VRSLs".....	587.132
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New Madrid 30' Quadrangle, including Bloomfield, Malden, New Madrid, and Sikeston 15' Quadrangles.

#### NEW MADRID COUNTY.

The following elevations are based on a bench mark of the U. S. Army Engineers described as follows: "New Madrid, post set near river bank in woods, 54 meters from river bank, 50 meters from top of bank of St. Johns Bayou, on land of Harry Powers, top of brass cap." The elevation of this bench mark is accepted as 286.970 feet.

The line was run between New Madrid and Malden and return by Leigh D. Townsend in 1908.

#### NEW MADRID QUADRANGLE.

##### New Madrid via St. Louis Southwestern Ry. to Malden.

New Madrid, 25 feet south of St. Louis Southwestern Railway, east of north-south street, in water stem to fire hydrant; top of bolt head marked "U. S. B. M. 298.40".....	Feet. 298.385
New Madrid, 0.8 mile west of, between railroad tracks, in top of corner stone; copper bolt; post has letters "U. S." chiseled in top.....	299.259
New Madrid, 3.6 miles west of, at northeast corner of T roads, 45 feet north of center of track, 20 feet east of center of wagon road running north-south, inside fence 2 feet from corner post; iron post stamped "301".....	301.237
Leave track and turn north to Lilbourn:	
Lilbourn, east of station, 315 feet from railroad crossing, at northeast corner of crossroads, in fence corner at southwest corner of field; iron post stamped "285".....	284.866
Lilbourn, crossing of St. Louis & San Francisco R. R.; top of rail.....	286.44
Lilbourn, 1 mile west of, short distance east of Boden, about middle of first bridge west of Lilbourn on north side; top of bolt marked "U. S. B. M. 280.64□".....	285.531
Lilbourn, 2.6 miles west of, south side of railroad right of way, 24.8 feet from south rail, 9.5 feet west of milepost 39, in line with telegraph poles; iron post stamped "281".....	280.509
Catron, on grounds of old sawmill, just outside of north side of right of way, 50 feet north of center of main track, southwest of patch of woods, west of easternmost house in Catron; iron post stamped "282".....	281.709
Como, north of railroad right of way, 47 feet north of center of track, somewhat west of section house numbered 8, on opposite side of track, in line with cattle guard and right of way fence, in corner formed by fence; iron post stamped "283".....	282.613
Parma, 51.5 feet south of center of St. Louis Southwestern Ry. track, 54 feet from center of St. Louis & San Francisco R. R. track, opposite union station, at intersection of west fence of St. Louis & San Francisco R. R. right of way and south fence of St. Louis Southwestern Ry. right of way, just inside fence on athletic grounds; iron post stamped "281".....	281.305
Hyman, east of, 49 feet north of center of track in right of way of St. Louis Southwestern Ry., in corner formed by right of way fence and fence running out from cattle guard; iron post stamped "281".....	280.688
Malden, 3.1 miles northeast of, 43 feet southeast of southeast corner of railroad bridge over ditch No. 4, 80 feet east of center of ditch No. 4, east of and along south edge of St. Louis Southwestern Ry. right of way, just outside of right of way of ditch No. 4; iron post stamped "279".....	279.413

Malden, 2 miles northeast of, northwest of mile sign 56 on telegraph pole at east end of bridge No. 138-A, on top of bridge stringer on north side at east end of bridge 138-A, last bolthead on top; marked "U. S. B. M. 282.56".....	Feet. 282.49
Malden, directly across street from city hall, north side of Main Street, about 200 feet east of four-corners, west of livery barn belonging to W. B. Bladsoe, in concrete foundation of brick office building belonging to Doctors E. T. Penny, E. T. Van Cleve, and E. M. Edwards, south side in southeast corner about 1.5 feet above ground; aluminum tablet stamped "294".....	294.043

**Palmyra Quadrangle.****LEWIS, MARION, MONROE, RALLS, AND SHELBY COUNTIES.**

The elevations in the following list are based upon Mississippi River Commission permanent bench mark No. 12, at West Quincy, a copper bolt leaded horizontally in the third course of masonry from bottom and ninth from the top of the west abutment of the Quincy, Omaha & Kansas City Railroad bridge, in north face, 2 inches from east corner. The elevation of this bench mark is 477.810 feet by the 1907 adjustment. In 1902 this leveling was checked by connecting with United States permanent bench mark No. 16, at Hannibal, the accepted elevation of which is 489.436 feet.

The leveling was done in 1901 and 1902 by H. V. Rees.

**PALMYRA QUADRANGLE.****West Quincy west along railroad via Maywood to Dunham.**

West Quincy (Mississippi River Commission P. B. M. No. 12), in third course of masonry from bottom and ninth from top of west abutment of Quincy, Omaha & Kansas City R. R. bridge, in north face, 2 inches from east corner, center of copper bolt leaded horizontally.....	Feet. 477.810
West Quincy, on northeast corner of station platform.....	483
Taylor, in northwest corner of station platform; copper nail.....	490.96
Maywood, at southwest corner of station platform; copper nail.....	518.51

**Maywood along highway south to Hester and west to Naomi.**

T. 59 N., R. 6 W., in southern part of NW. $\frac{1}{4}$ sec. 18, 0.3 mile east of Hester, in sixth tier of stone from top of south abutment of wagon bridge over South Fabius River; bronze tablet stamped "511 Q".....	510.722
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**Hester south along highway to Palmyra.**

Palmyra Junction, in southeast corner of station platform; copper nail....	652.88
Palmyra Junction, in front of station; top of inside rail.....	651.9

**Palmyra along railroad to Woodland, thence south along highway to Rensselaer and east to Ely.**

T. 57 N., R. 6 W., in southeastern part of NW. $\frac{1}{4}$ sec. 8, at Woodland, in southeast corner of stone foundation of brick schoolhouse; bronze tablet stamped "685 Q".....	685.304
Woodland, in front of station; top of rail.....	681.3
West Ely, in front of post office, at foot of hitching post; cross on large rock.	718.58
Rensselaer, in southwest corner of station platform; copper nail.....	734.15



	Feet.
Rensselaer, in front of station; top of rail.....	734. 3
Huntington, in northwest corner of station platform; copper nail.....	729. 07
T. 56 N., R. 6 W., in center of SW. $\frac{1}{4}$ sec. 8, in front of stone, under porch, in northeast foundation stone; bronze tablet stamped "727.5 Q".....	727. 830
Ely, in southwest corner of station platform; copper nail.....	735. 54
Ely, in front of station; top of inside rail.....	735. 1
T. 56 N., R. 7 W., in north part of NE. $\frac{1}{4}$ sec. 2, in north face of stone founda- tion of house; bronze tablet stamped "729 Q".....	728. 842

**Ely north along highway via Mount Vernon, Emerson, and Naomi, to Durham.**

T. 57 N., R. 7 W., 100 yards east of southwest corner of sec. 15, Mount Ver- non, in southwest stone of coping around church; bronze tablet stamped "664 Q".....	663. 764
T. 58 N., R. 7 W., at northeast corner of SE. $\frac{1}{4}$ sec. 29, at crossroads, in south face of stone foundation near southwest corner of schoolhouse; bronze tab- let stamped "695 Q".....	695. 423
Philadelphia, in southeastern part of NE. $\frac{1}{4}$ sec. 12, T. 58 N., R. 8 W., in northeast corner of stone foundation of Baptist Church; aluminum tablet stamped "711 Q" (on spur not checked).....	711. 056
Emerson, center of NE. $\frac{1}{4}$ sec. 29, T. 59 N., R. 7 W., in southeast corner of stone foundation of Christian Church; bronze tablet stamped "672 Q" ..	672. 046
Naomi, in front of post office, in northeast corner of platform; copper nail.	566. 86
Durham, in southwest corner of station platform; copper nail.....	647. 13
Durham, in front of station; top of rail.....	646. 8

**Durham along highway east to Argola, thence south to Nelsonville.**

Argola, in front of post office, about 6 feet from southwest corner; cross on large stone.....	703. 92
Nelsonville, in front of post office; cross on northeast corner of step.....	716. 23

**Naomi west along highway to Nelsonville.**

Benbow, at west end of step in front of post office; cross on stone.....	693. 63
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**Nelsonville south along highway via Cherrydell and Emden to Lakeman.**

Cherrydell, in northwest corner of NW. $\frac{1}{4}$ sec. 30, T. 59 N., R. 8 W., in stone foundation of west side of post office, 7.5 feet north of southwest corner; bronze tablet stamped "695 Q".....	694. 685
Emden, in front of post office, in southeast corner of platform; copper nail.	745. 50
Emden, in southwest corner of NW. $\frac{1}{4}$ sec. 25, T. 58 N., R. 9 W., in southwest corner of stone foundation under Christian Church; bronze tablet stamped "743 Q".....	743. 221

**Cherrydell northwest via Sigsbee toward Elgin (single spur line).**

Sigsbee, in west part of SE. $\frac{1}{4}$ sec. 14, T. 59 N., R. 9 W., in south side of stone foundation of house owned by D. J. Beville; bronze tablet stamped "739 Q".....	739. 454
T. 59 N., R. 10 W., SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 12, in southwest corner of stone founda- tion of T. G. Moore's house; bronze tablet stamped "756 Q".....	755. 608

**Sigsbee southwest along highway via Burkesville (single spur line).**

Burkesville, in northeast part of SE. $\frac{1}{4}$ sec. 1, T. 58 N., R. 10 W., in north- east corner of stone foundation of Charles Buckingham's house; alumi- num tablet stamped "749 Q" .....	749. 468
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**Fly west along Chicago, Burlington & Quincy R. R. to point west of Lakenan (single spur line).**

Monroe City, in southeast part of NE. $\frac{1}{4}$ sec. 13, T. 56 N., R. 8 W., in north face of stone coping of First Baptist Church; bronze tablet stamped "748 Q".....	Feet. 748. 117
Hunnewell, in southeast corner of station platform; copper nail.....	757. 89
Hunnewell, in front of station; top of rail.....	757. 9
Lakenan, in northwest corner of station platform; copper nail.....	732. 20
Lakenan, in front of station; top of inside rail.....	732. 4
T. 56 N., R. 10 W., at west side of NE. $\frac{1}{4}$ sec. 1; iron post stamped "747 Q".....	752. 691

**Lakenan northwest 2.5 miles (single spur line).**

T. 57 N., R. 10 W., in west side of SE. $\frac{1}{4}$ sec. 36, in west face of stone foundation under J. Clark's house; bronze tablet stamped "739 Q" (Fly levels from Emden gave elevation 6 feet less).....	744. 980
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**Hunnewell northwest 2.3 miles (single spur line).**

Hunnewell in south part of NW. $\frac{1}{4}$ sec. 12, T. 57 N., R. 9 W., in southwest corner of stone foundation of A. C. Spalding's drug store; bronze tablet stamped "758 Q".....	758. 687
T. 57 N., R. 9 W., at southeast corner SW. $\frac{1}{4}$ sec. 35; iron post stamped "754 Q".....	754. 165

**Hunnewell northeast 1.5 miles (single spur line).**

T. 57 N., R. 8 W., in south part of SW. $\frac{1}{4}$ sec. 31, 1.5 miles northeast of Hunnewell, in north face of stone foundation of James McClintock's house; bronze tablet stamped "754 Q".....	754. 452
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**Hunnewell southwest along highway toward Hawkins and southeast toward Stoutsville.**

T. 55 N., R. 10 W., at northwest corner of NE. $\frac{1}{4}$ sec. 1; iron post stamped "691.5 Q".....	691. 691
T. 55 N., R. 9 W., in central part of NE. $\frac{1}{4}$ sec. 5, in ledge of rock about 20 feet east of road; bronze tablet stamped "697 Q".....	697. 532

**Monroe City southeast via Hatch to Cincinnati.**

T. 55 N., R. 8 W., in northeast part of NE. $\frac{1}{4}$ sec. 1, in ledge of rock on creek bank about 100 yards from road; bronze tablet stamped "650 Q".....	650. 432
T. 55 N., R. 7 W., in northeast part of SW. $\frac{1}{4}$ sec. 2, in northeast corner of stone schoolhouse; bronze tablet stamped "723 Q".....	723. 205
Cincinnati, in northeast corner of SW. $\frac{1}{4}$ sec. 8, T. 55 N., R. 6 W., in east face of stone foundation of Methodist Church; bronze tablet stamped "527 Q".....	527. 024

**Woodland east along railroad via Oakwood to Hannibal.**

Withers Mill, northeast corner of station platform; copper nail.....	607. 80
Bear Creek, southeast corner of station platform; copper nail.....	587. 30
Oakwood, Chicago, Burlington & Quincy R. R. station, at southeast corner of platform; copper nail.....	510. 89
Oakwood, Missouri, Kansas & Texas Ry. station, southeast corner of station platform; copper nail.....	507. 67
Permanent bench mark No. 16, copper bolt leaded horizontally in face of natural rock at east entrance of tunnel at Missouri end of railroad bridge at Hannibal. Bolt is in rock facing east and on south side of tunnel, 7 feet south of entrance and about 4 feet above road level.....	489. 436

## Dunnellson, Edina, Kahoka, and Pulaski Quadrangles.

## ADAIR, CLARK, KNOX, LEWIS, MACON, SCHUYLER, AND SCOTLAND COUNTIES.

The elevations in the following list were previously published on pages 107-111, Bulletin 185, and are based on a bench mark of the U. S. Corps of Engineers (Mississippi River Commission), at Alexandria, in sec. 8, T. 64 N., R. 5 W. The bench mark, an eyebolt in top of mooring stone at boat landing, and its elevation, as corrected by the 1907 adjustment of the Coast and Geodetic Survey, is accepted as 493.605 feet above mean sea level.

Most of the leveling was done in 1900 by H. V. Rees. The line from La Plata to Gibbs was run in 1905 by D. V. Vandiver.

## KAHOKA QUADRANGLE.

	Feet.
Weber, T. 60 N., R. 6 W., in west part of NE. $\frac{1}{4}$ sec. 7, on east side of large brick house of J. W. Willows, commonly known as "Old Tate Place," in stone foundation; bronze tablet stamped "615 A".....	616. 092
Ewing, T. 60 N., R. 7 W., SE. $\frac{1}{4}$ sec. 7, in east face of solid stone foundation of Reformed Lutheran Church; bronze tablet stamped "687 A"....	688. 364
T. 60 N., R. 8 W., quarter corner east side of sec. 10, on property of William Jusfram; iron post stamped "681 A".....	682. 208
T. 60 N., R. 9 W., in north part of SE. $\frac{1}{4}$ sec. 8, on place of W. E. Piner, at side of road under hedge fence north of gateway; iron post stamped "681 A".....	681. 732
T. 61 N., R. 6 W., in northern part of SE. $\frac{1}{4}$ sec. 20, on east side of large brick house owned by Eliza Glavin, in stone casing over cellar window; bronze tablet stamped "640 A".....	640. 111
Lewiston, T. 61 N., R. 8 W., sec. 17, on bank building at southeast corner of Main and Elm Streets; aluminum tablet stamped "725 A".....	725. 863
La Belle, T. 61 N., R. 9 W., sec. 5, in northwest corner of stone foundation of bank; aluminum tablet stamped "738 A".....	738. 336
T. 62 N., R. 6 W., near northwest corner of sec. 29, in northwest corner of yard of M. L. Spalding; iron post stamped "637 A".....	636. 561
T. 62 N., R. 7 W., about center of SE. $\frac{1}{4}$ sec. 16, 40 feet west of lane to L. E. Moore's house, on north side of road at foot of choke cherry tree; iron post stamped "671 A".....	671. 058
Bunker Hill, T. 62 N., R. 8 W., SE. $\frac{1}{4}$ sec. 11, in southeast corner of doorway of George Nelson; iron post stamped "701 A".....	701. 858
T. 62 N., R. 9 W., northeast part of sec. 20, in southeast corner of doorway of H. P. Gregory; iron post stamped "674 A".....	675. 067
T. 63 N., R. 6 W., sec. 6, schoolhouse No. 1, in southeast corner of stone foundation; bronze tablet stamped "538 A".....	537. 741
Derrahs, T. 63 N., R. 7 W., SW. $\frac{1}{4}$ sec. 27, on north side of road, in fence corner southeast of schoolhouse; iron post stamped "609 A".....	609. 426
Williamstown, T. 63 N., R. 8 W., SE. $\frac{1}{4}$ sec. 20, in west side of stone foundation of Southern Methodist Church; bronze tablet stamped "721 A"....	722. 757
T. 63 N., R. 9 W., quarter corner west side of sec. 28, at northeast corner of crossroads, on property of J. A. Arthur; iron post stamped "709 A".....	710. 260
T. 63 N., R. 10 W., near center of sec. 23, 0.5 mile southeast of Colony, in north face of stone foundation of H. S. Coleman's house; bronze tablet stamped "745 A".....	746. 032
Alexandria, T. 64 N., R. 5 W., sec. 8, in top of mooring stone at boat landing; eyebolt (Mississippi River bench mark No. 5).....	493. 602

T. 64 N., R. 6 W., near northwest corner of sec. 8, at crossroads, in stone step of west door of Fox River Church; aluminum tablet stamped "533 A".....	Feet. 532. 883
Antioch, T. 64 N., R. 7 W., SE. $\frac{1}{4}$ sec. 20, in northwest corner of Elwell's store; bronze tablet stamped "698 A".....	698. 010
Neeper, T. 64 N., R. 8 W., center of sec. 21, in southeast corner of church yard; iron post stamped "730 A".....	730. 990
Fairmount, T. 64 N., R. 9 W., SW. $\frac{1}{4}$ sec. 21, in northeast corner of public square; iron post stamped "780 A".....	780. 663
St. Francisville, T. 65 N., R. 6 W., SW. $\frac{1}{4}$ sec. 3, 1 block northwest of post-office, in southwest corner of H. C. Campbell's residence; aluminum tablet stamped "536 A".....	542. 362
Kahoka, in front of station; top of inside rail.....	697. 4
Kahoka, T. 65 N., R. 8 W., sec. 24, at southwest corner of county courthouse, in window ledge; aluminum tablet stamped "704 A".....	705. 017
Medill, in front of station; top of inside rail.....	703. 7
Medill, T. 65 N., R. 8 W., sec. 16, 450 feet west of crossing of Chicago, Burlington & Quincy R. R. and Atchison, Topeka & Santa Fe Ry., in masonry around signal post; aluminum tablet stamped "703 A".....	704. 116
Luray, T. 65 N., R. 9 W., in SE. $\frac{1}{4}$ sec. 10, in northwest corner of Baptist Church foundation; bronze tablet stamped "746 A".....	746. 564
Granger, sec. 2, T. 65 N., R. 10 W., in southwest corner of foundation of Granger Exchange Bank; bronze tablet stamped "761 A".....	761. 596
Revere, T. 66 N., R. 7 W., in NW. $\frac{1}{4}$ sec. 28, in middle of south side of stone foundation of Hotel Revere; aluminum tablet stamped "682 A".....	683. 635
T. 66 N., R. 8 W., quarter corner south side of sec. 28, in southwest corner of dooryard of J. O. Murphy; iron post stamped "713 A".....	713. 855
T. 66 N., R. 9 W., quarter corner west side of sec. 28, on property of J. S. Snyder; iron post stamped "733 A".....	734. 130

## DUNNELLSON 15' QUADRANGLE.

T. 66 N., R. 10 W., 0.1 mile east of northwest corner, in fence corner on property of Joseph Miller; iron post stamped "745 A".....	746. 149
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## EDINA QUADRANGLE.

La Plata, foundation stone under first window north of southeast entrance to savings bank; aluminum tablet stamped "934 ADJ 1904". (Set in 1905 on double line from Glasgow to Gibbs).....	933. 610
T. 61 N., R. 10 W., southwest corner of NW. $\frac{1}{4}$ sec. 9, at northeast corner of crossroads; iron post stamped "696 A".....	696. 547
T. 61 N., R. 11 W., SE. $\frac{1}{4}$ sec. 9, in corner of Robert Hysell's dooryard; iron post stamped "735 A".....	735. 891
T. 61 N., R. 12 W., at southwest corner sec. 17, 200 yards east of road, in corner of door yard of J. C. Beck; iron post stamped "855 A".....	855. 715
T. 61 N., R. 13 W., in southwest corner sec. 11, in corner of dooryard of Thomas Powers; iron post stamped "874 A".....	874. 829
Gibbs, SW. $\frac{1}{4}$ sec. 12, T. 61 N., R. 14 W., in northwest face of Gibbs Savings Bank; aluminum tablet stamped "910 A".....	910. 933
Knox City, southeast of center of sec. 28, T. 62 N., R. 10 W., in west side of Cater and Hunsaker's store; aluminum tablet stamped "766 A".....	766. 115
Edina, sec. 18, T. 62 N., R. 11 W., in front of station; top of rail.....	733. 9
Edina; NW. $\frac{1}{4}$ sec. 19, T. 62 N., R. 11 W., 50 feet east of stand in public square, in meridian post; aluminum tablet stamped "814 A".....	814. 661
T. 62 N., R. 12 W., in west center of NE. $\frac{1}{4}$ sec. 21, about 30 yards south of railroad track, in road corner; iron post stamped "842 A".....	842. 152

Brashear, in center of NW. $\frac{1}{4}$ sec. 24, T. 62 N., R. 13 W., in casing of east window on north side of schoolhouse; aluminum tablet stamped "868 A".	868. 725
T. 62 N., R. 14 W., in NE. $\frac{1}{4}$ sec. 22, in corner of road adjacent to property of G. M. Leo; iron post stamped "921 A"	921. 553
T. 63 N., R. 11 W., in southeast corner of SE. $\frac{1}{4}$ of sec. 6, in corner of dooryard of property of M. Beck; iron post stamped "777 A"	778. 180
T. 63 N., R. 12 W., near northwest corner sec. 9, in west face of stone foundation of James McWilliams's house; aluminum tablet stamped "845 A"	846. 116
Adair, NE. $\frac{1}{4}$ sec. 20, T. 63 N., R. 13 W., in west face of brick foundation of Catholic parish house; aluminum tablet stamped "928 A"	926. 871
Clay, NW. $\frac{1}{4}$ sec. 34, T. 63 N., R. 14 W., about 80 yards east of post office, near large oak tree; iron post stamped "931 A"	931. 738
T. 64 N., R. 10 W., in south part of SW. $\frac{1}{4}$ sec. 28, in southwest corner of dooryard of property of Mary Boyer; iron post stamped "652 A"	652. 969
Sandhill, center of sec. 33, T. 64 N., R. 11 W., 200 yards from post office, in brick foundation of house of S. P. Childers; aluminum tablet stamped "802 A"	803. 490
T. 64 N., R. 12 W., center of SW. $\frac{1}{4}$ sec. 7, in corner of dooryard of William Purvis; iron post stamped "837 A"	837. 372
Hazelville, south of center of SW. $\frac{1}{4}$ sec. 35, T. 64 N., R. 13 W., corner of road on Fred Frazer's property; iron post stamped "870 A"	871. 288
Willmathsville, northwest quarter corner on east side of sec. 25, T. 64 N., R. 14 W., at southeast corner of Union Church; iron post stamped "939 A"	939. 315
Memphis, in front of station; top of inside rail	757
Memphis, sec. 7, T. 65 N., R. 11 W., in schoolhouse yard, in top of meridian post; bronze tablet stamped "786 A"	787. 069
T. 65 N., R. 12 W., in south part of NW. $\frac{1}{4}$ sec. 25, in northwest corner of Miller schoolhouse yard; iron post stamped "796 A"	797. 116
T. 65 N., R. 13 W., in south part of NE. $\frac{1}{4}$ sec. 3, in corner of S. B. Pile's orchard; iron post stamped "855 A"	855. 840
T. 65 N., R. 14 W., in east part of SW. $\frac{1}{4}$ sec. 26, at southeast corner of crossroads, adjacent to property of J. N. Cannon, in large stone; bronze tablet stamped "829 A"	830. 305
T. 66 N., R. 11 W., near center of sec. 34, adjacent to land owned by W. H. Summers; iron post stamped "760 A"	761. 397
T. 66 N., R. 12 W., southwest part of NW. $\frac{1}{4}$ sec. 33, on John Ridges's property, in northeast corner of crossroads; iron post stamped "790 A"	790. 501
Downing, NW. $\frac{1}{4}$ sec. 33, T. 66 N., R. 13 W., in foundation of store opposite station; bronze tablet stamped "875 A"	875. 511

## PULASKI QUADRANGLE.

T. 66 N., R. 14 W., near center of NE. $\frac{1}{4}$ sec. 26, at northeast corner of church; iron post stamped "900 A"	900. 917
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## Atlanta, Glasgow, Macon, Moberly, Shelbyville, and Shelbyville Quadrangles.

## HOWARD, KNOX, MACON, MONROE, RANDOLPH, AND SHELBY COUNTIES.

The elevations in the following list are based upon the Missouri River Commission bench mark at Glasgow, from which a double-rodged line was run during 1905 along the railway via Higbee, Moberly, Macon City, and Laplata to Gibbs in Adair County, connecting

there with levels brought from the Mississippi River Commission bench mark of the United States Army Engineer Corps at Alexandria.

The leveling was done in 1905 by D. V. Vandiver. Additional work was done in 1906 in the Atlanta and Macon quadrangles by F. H. West.

The standard bench marks are stamped with the letters "ADJ" in addition to their figures of elevation.

#### GLASGOW QUADRANGLE.

##### Glasgow along Chicago & Alton R. R. to Higbee.

Glasgow, at west side of second pier from southeast abutment of railroad bridge, copper bolt in bench mark stone set 3.5 feet under ground: above and concentric with the bolt, was set an iron pipe with 10-inch flange at bottom and cap at top (now missing), terminating in rounded knob which is also taken as a permanent bench mark (159 47-3).....	Feet. 1 618. 034
Steinmetz, 100 feet southeast of station, in northwest corner of stone foundation of post office; aluminum tablet stamped "800 ADJ 1905".....	799. 818
Armstrong, 100 feet south of station, in southwest corner of stone curbing of station platform; aluminum tablet stamped "832 ADJ 1905".....	831. 784
Howard County and Randolph County line, 0.25 mile west of, 0.25 mile east of mile post "Chi. 368, St. L. 199," in northeast corner of concrete foundation bridge D 3677; aluminum tablet stamped "835 ADJ 1905".....	834. 910
Yates, 0.8 mile east of, 20 feet north of track, bottom of 20-foot embankment, in top of second culvert stone from end; aluminum tablet stamped "816 ADJ 1905".....	815. 493
Higbee, in northeast corner of foundation of C. W. Williams's jewelry store, 170 feet east of Missouri, Kansas & Texas Railway building is on southeast corner of streets; aluminum tablet stamped "886 ADJ 1905".....	886. 101

#### MOBERLY QUADRANGLE.

##### Higbee along Wabash R. R. to Cairo.

Elliott, 700 feet north of station, in northwest base of foundation stone of culvert; aluminum tablet stamped "857 ADJ 1905".....	856. 858
Moberly, in southeast corner of express office adjoining Wabash station, 4 feet north of south edge of foundation, bench mark faces track; aluminum tablet stamped "872 ADJ 1905".....	871. 953

#### MACON QUADRANGLE.

##### Cairo along Wabash R. R. to Macon.

Cairo, in north face of Bank of Cairo, 4 feet west of east edge; aluminum tablet stamped "864 ADJ 1905".....	864. 290
Jacksonville, 300 feet west of tracks, in south front 6 feet west of east edge of bank building, north side of Randolph Street; aluminum tablet stamped "868 ADJ 1905".....	867. 670
Excello, 360 feet southwest of station, 200 feet west of tracks, in wall of Powell's drug store; aluminum tablet stamped "871 ADJ 1905".....	870. 713
Macon, 3.5 miles south of, 600 feet east of railroad, 150 feet east of public road, in small graveyard on Grant's farm, in base stone of Grant monument; aluminum tablet stamped "849 ADJ 1905".....	849. 015

<sup>1</sup> Subsurface elevation of copper bolt in stone.

Macon, courthouse, in limestone foundation 3 feet east of southwest corner, 20 feet west of south entrance; aluminum tablet stamped "875 ADJ 1905".....	874.450
Macon City, bronze tablet in meridian stone courthouse yard, 100 feet southwest of south entrance of courthouse; stamped "873 ADJ 1905"....	873.028
Clarence west along Chicago, Burlington & Quincy R. R. to Macon.	
Clarence, 150 feet south of station, south side of park, 70 feet northwest of Shelby County State Bank, 70 feet north of Parlor drug store; iron post stamped "823 ADJ 1905".....	823.530
Anabel, 70 feet south of east end of station, 40 feet north of E. I. Hogen's store; iron post stamped "838 ADJ 1905".....	838.126
Anabel, 3 miles west of, sec. 1, northwest corner of road crossing; iron post stamped "837 ADJ 1905".....	837.019
Macon, 3 miles east of, on northeast corner of stone abutment of bridge over small stream, bridge numbered 67.67, 0.25 mile east of road crossing; aluminum tablet stamped "784 ADJ 1905".....	784.026
Clarence south along roads to Duncans Bridge, thence southwest to Cairo.	
T. 57 N., R. 12 W., southwest corner of sec. 33, 3.5 miles south of Clarence road crossing; iron post stamped "787 ADJ 1905".....	787.284
Enterprise, T. 57 N., R. 12 W., southeast corner of sec. 17, at road crossing; iron post stamped "811 ADJ 1905".....	811.626
Enterprise, 3 miles south of, on Marion-Shelby county line, in northwest corner of T in roads; iron post stamped "808 ADJ 1905".....	808.210
Duncans Bridge post office, in southeast corner of F. Wedding's yard, west side of road; iron post stamped "717 ADJ 1905".....	717.141
T. 55 N., R. 12 W., northeast corner of NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 30, in corner of field at southwest corner of junction of T roads, 2 feet southwest from center curve post in wire fence, 15 feet from either fence, property of J. T. Mitchell, post 100 yards northeast of east of house; stamped "777 ADJ 1905".....	777.031
Ash post office, T. 55 N., R. 12 W., center of sec. 31, in northeast corner of Hickory Grove Baptist Church yard, 35 feet northeast of northeast corner of church, 2 feet from wire fence on east side of yard and 5 feet southwest from 3-foot oak tree; iron post stamped "812 ADJ 1905".....	811.637
T. 55 N., R. 13 W., northwest corner of SW. $\frac{1}{4}$ sec. 35, 5.25 miles east by 0.5 mile north of Cairo, in corner of field at L in road, 10 feet east from 12-inch persimmon tree, 12 feet southeast from corner post of fence line, 0.12 mile west from F. Ingram's house (vacant); iron post stamped "812 ADJ 1905".....	820.958
T. 54 N., R. 13 W., northeast corner of sec. 6, 3 miles east of Cairo, northeast corner of C. E. Woods yard, southwest corner of junction of T roads, in corner of fence, 2 feet from either fence; iron post stamped "836 ADJ 1905".....	836.393
Cairo, T. 54 N., R. 14 W., quarter corner on west side sec. 2, in Bank of Cairo, 4 inches west of east edge and 4 feet above ground; aluminum tablet stamped "864".....	864.290
Enterprise via Cox post office to Jacksonville.	
T. 56 N., R. 13 W., southeast corner sec. 13, in southwest corner of W. N. Trussell's yard, 3 feet from either side of angle of fence line; iron post stamped "781 ADJ 1905".....	780.911
Cox post office, T. 56 N., R. 13 W., northwest corner of SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 20, near northeast corner of Fairview Church; iron post stamped "833"....	833.187

T. 55 N., R. 13 W., southeast part of NE. $\frac{1}{4}$ sec. 7, 3.8 miles east by 0.25 mile north of Jacksonville, in southwest corner of D. R. Haliburton's yard, at northeast corner of junction of T roads; iron post stamped "811".	Feet. 810. 788
Jacksonville, sec. 10, T. 55 N., R. 14 W., in bank, 4 inches from east edge and 4 feet from ground; aluminum tablet stamped "887".....	867. 670

**ATLANTA QUADRANGLE.****Macon along Wabash E. R. to La Plata.**

Macon, 3.5 miles north of, at northwest corner of road crossing; iron post stamped "887 ADJ 1905".....	886. 938
Axtell, 200 feet west of track, 200 feet north of wagon road, in southwest corner of foundation of house of A. L. Epperson; aluminum tablet stamped "895 ADJ 1905".....	894. 476
Axtell, 2 miles north of, 100 feet west of track, at public-road crossing and railroad crossing, on land of B. J. Simmons, inside of fence corner; iron post stamped "901 ADJ 1905".....	900. 516
Atlanta, 12 feet south of Atlanta State Bank, corner of street and alley in northwest corner stone of foundation of Attleberry brick building; aluminum tablet stamped "902 ADJ 1905".....	902. 233
Love Lake, 200 feet west of station, in southeast corner of foundation of post office; aluminum tablet stamped "915 ADJ 1905".....	914. 587
La Plata, 2.5 miles south of, at road crossing, 2 feet inside of field; iron post stamped "937 ADJ 1905".....	937. 275

**Love Lake east along public roads via Sue City to Pleasant Grove School.**

Love Lake, 3.8 miles east of, sec. 35, T. 60 N., R. 14 W.; iron post stamped "885 ADJ 1905".....	884. 476
Sue City, in east side of southeast corner foundation stone of Baptist Church; aluminum tablet stamped "871 ADJ 1905".....	870. 539
Sue City, 3.5 miles east of, T. 60 N., R. 13 W., line between secs. 36 and 25, 0.25 mile east of Sailing Creek, 0.25 mile south of Asa Blanchard's dwelling; iron post stamped "768 ADJ 1905".....	768. 157

**Anabel north to Sue City.**

T. 57 N., R. 13 W., 0.25 mile north of center of sec. 4, 12 feet from south end of tall hedge, 8 feet from west edge of road; iron post stamped "841 ADJ 1905".....	841. 895
T. 58 N., R. 13 W., middle of east boundary of SW. $\frac{1}{4}$ sec. 16, on north side of road, 50 feet southeast from southeast corner of house, opposite junction of T roads, 4 feet from fence around yard; iron post stamped "849 ADJ 1905".....	848. 851
T. 59 N., R. 13 W., middle of south boundary of sec. 33, northeast corner of junction of crossroads, 5 feet from edge of either road, in southwest corner of S. S. Ingersoll's yard, 60 feet from southwest corner of house; iron post stamped "836".....	836. 225
T. 59 N., R. 13 W., northeast corner of sec. 20, at southwest corner of crossroads, 7 feet from edge of either road, 3 feet northeast from corner post in wire fence around field; iron post stamped "825 ADJ 1905".....	825. 298

**SHELBYVILLE QUADRANGLE.****Pleasant Grove school southeast along highway to Plevna, thence south to Shelbyna.**

Pleasant Grove schoolhouse, district No. 3, 4 miles north of Cherry Box post office, opposite C. J. Mote's and J. E. Douglas's mail boxes, 60 feet west of schoolhouse, at road forks; iron post stamped "849 ADJ 1905".....	848. 470
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Plevna, 6 miles west of, 200 feet east of road turning south to Clarence, 100 feet southeast of Washington schoolhouse, southeast corner of schoolhouse yard; iron post stamped "830 ADJ 1905".....	<b>Fet.</b> 829. 781
Plevna, 3 miles west of, in northwest corner of Rhodes schoolhouse yard, district No. 2; iron post stamped "801 ADJ 1905".....	801. 026
Plevna, 1.5 miles south by 0.5 mile west of, 700 feet south of Shelby County and Knox County line, northwest corner sec. 2, in northwest corner of foundation stone of Hickman's house; aluminum tablet stamped "791 ADJ 1905".....	791. 452
T. 58 N., R. 11 W., southeast corner of sec. 2, 5 miles northwest of Shelbyville, 300 feet east of O'Brien Chapel, in northeast corner stone O'Brien schoolhouse; aluminum tablet stamped "788 ADJ 1905".....	788. 519
T. 58 N., R. 11 W., southwest corner of sec. 5, 3 miles northwest of Shelbyville, in southwest corner of Wm. Werter's house; aluminum tablet stamped "785 ADJ 1905".....	784. 833
Shelbyville, in foundation stone of courthouse, 2 feet east of south entrance; aluminum tablet stamped "774 ADJ 1905".....	774. 348
Shelbyville, 3.5 miles southwest of, sec. 8, T. 57 N., R. 10 W., T road, primary traverse station 7; iron post stamped "762 ADJ 1905".....	762. 383

**Pleasant Grove Schoolhouse south along public roads to Clarence.**

Cherry Box, 0.25 mile south of, 120 feet northwest of Mennonite Church, inside of field east of road; iron post stamped "838 ADJ 1905".....	838. 031
Cherry Box, 3 miles south of, on northeast corner of crossroads on property of Alex Brown; iron post stamped "835 ADJ 1905".....	834. 596
Hagers Grove, 1 mile north of, in southwest corner of yard of Grove schoolhouse, district No. 1; iron post stamped "797 ADJ 1905".....	795. 848
Hagers Grove, 1.5 miles southwest of, in pear orchard opposite Withrell's house; iron post stamped "769 ADJ 1905".....	769. 019
Clarence, 2.5 miles north by 0.5 mile east of, southeast corner of field, 2 feet from fence corner, at turn west in road; iron post stamped "803 ADJ 1905".....	802. 487

**SHELBYNA QUADRANGLE.**

**Shelbina along Hannibal & St. Joseph Ry. to Clarence.**

Shelbina, opposite west end of station, directly opposite Waverly Hotel; iron post stamped "780 ADJ 1905".....	779. 661
Lentner, 1.25 miles east of, 4.5 miles west of Shelbina, 70 feet south of track, east end of wedge-shaped piece of ground owned by Mr. Coopwriter; iron post stamped "789 ADJ 1905".....	788. 935
Lentner, 1.5 miles west of, T. 57 N., R. 12 W., sec. 19, 56 feet north of track, in southwest corner of F. A. Hall's orchard; iron post stamped "791 ADJ 1905".....	791. 119
T. 57 N., R. 12 W., sec. 23, 2.8 miles east of Clarence, 110 feet south of track, 2 feet south of public road; iron post stamped "790 ADJ 1905".....	790. 058

**Cassville, Forsyth, and Springfield 30' Quadrangles.**

**BARRY, CHRISTIAN, STONE, AND TANEY COUNTIES.**

The elevations in the following list are based upon the Coast and Geodetic Survey bench mark "CIX" at Monett, the elevation of which is accepted as 1,302.480 feet above mean sea level as determined by the 1907 adjustment. The elevations also agree with

Arkansas levels based upon a double line to Denver from a Coast and Geodetic Survey bench mark at Seligman.

The leveling was done in 1904 and 1905 by D. V. Vandiver. Additional work was done in the Forsyth quadrangle in 1906 by F. W. Hughes.

The standard bench marks are stamped "ADJ 1903" in addition to the figures of elevation.

#### CASSVILLE QUADRANGLE.

Monett east along St. Louis & San Francisco R. R. to Marionville, thence along highway to point 3 miles east (double line).

Monett, bottom of a square cut in stone foundation of brick building at northeast corner of Broadway and Third Street, under first window north of corner on Third Street, Commercial Bank; marked "U. S. □ B. M."....	Feet. 1,302.480
Verona, opposite Farmers Bank, in southwest corner of William Spalding's one-story brick building, occupied by McShaw (druggist), in stone foundation; aluminum tablet stamped "1273 ADJ 1903".....	1,273.377
Aurora, in foundation stone of Bank Saloon, corner of Olive and Madison Streets, under first window north of entrance on Madison Street; aluminum tablet stamped "1371 ADJ 1903".....	1,370.629
Marionville, 3 miles west of, 600 feet east of milepost 266, 70 feet east of county road crossing, on abutment stone southwest corner of trestle; aluminum tablet stamped "1395 ADJ 1903".....	1,395.312
Marionville, 300 feet east of station, in northeast corner of abutment of trestle 2636; aluminum tablet stamped "1351 ADJ 1903".....	1,351.480
Marionville, 3 miles east by 0.5 mile south of, in northeast corner of stone foundation of W. P. Oldham's house; aluminum tablet stamped "1373 ADJ 1903".....	1,372.866

#### FORSYTH QUADRANGLE.

Point 3 miles east of Marionville southeast to Hurley, thence south to Oak Grove post office.

School, 1 mile north by 1 mile west of, in stone foundation of porch of T. S. Wood's house; aluminum tablet stamped "1305 ADJ 1903".....	1,305.170
School, 200 feet east of center of road crossing, in stone foundation, 8 feet east of southwest corner; aluminum tablet stamped "1344 ADJ 1903" ..	1,344.779
Hurley, 2 miles southeast of, in northeast corner stone of foundation of J. B. Blissett's house; aluminum tablet stamped "1276 ADJ 1903".....	1,276.447
Otto, 2.5 miles north of, 0.5 mile north of Cram Creek, 100 feet east of road, in limestone bluff; aluminum tablet stamped "1115 ADJ 1903".....	1,115.024
Otto, 2.25 miles southwest of, 200 feet west of house, 120 feet north of Wilson Branch, 100 feet north of road by spring box, in large limestone boulder; aluminum tablet stamped "987 ADJ 1903".....	987.379
Galena, in northwest corner of jail, 1.5 feet above ground; aluminum tablet stamped "1019 ADJ 1903".....	1,019.116
Galena, 4 miles east of, 4 miles north of Reeds Spring, in southwest corner of stone foundation of fourth district schoolhouse; aluminum tablet stamped "1024 ADJ 1903".....	1,024.296
Reeds Spring, 200 feet southwest of mill, 160 feet south of railroad, 100 feet south of road, in rear of a one-story house, in limestone boulder; aluminum tablet stamped "1179 ADJ 1903".....	1,179.194
Oakland schoolhouse, in southwest corner of, 3.5 miles southwest of Reeds Spring; aluminum tablet stamped "1380 ADJ 1903".....	1,380.290

Radical post office, 1 mile southeast of, 0.25 mile north of Mayberry Ferry, in southeast corner of stone chimney of Thomas's house; aluminum tablet stamped "783 ADJ 1903" .....	Free. 783. 571
<b>Blue Eye along highway east to Pinetop, thence south to Omaha.</b>	
Blue Eye, 1 mile north of, at T in roads, in southeast corner of stone foundation of Rube Butler's house; aluminum tablet stamped "1291 ADJ 1903" .....	1, 291. 916
Blue Eye, 5.6 miles north of, forks of roads to Galena and Cedar Valley, opposite blacksmith shop, in sandstone chimney of J. D. Bowman; aluminum tablet stamped "1302 ADJ 1903" .....	1, 302. 280
Cedar Valley, to right of entrance to cellar of Wells's house, in sandstone foundation of; aluminum tablet stamped "821 ADJ 1903" .....	821. 966
<b>Pinetop east along highways to Mincy, thence north to Forsyth, thence northwest via Walnut Shade to Spokane, thence southwest to Reeds Spring.</b>	
Pinetop, 1 mile southeast of, 400 feet east of Turkey Creek, 200 feet from road crossing, in limestone ledge; aluminum tablet stamped "1124 ADJ 1903" .....	1, 124. 720
Mincy, 2.8 miles west of, in saddle in ridge, 50 feet north of forks, in 10-ton sandstone boulder; aluminum tablet stamped "1243 ADJ 1903" .....	1, 243. 301
Mincy, 300 feet east of post office, in foundation of W. T. Moore's house; aluminum tablet stamped "914 ADJ 1903" .....	914. 412
Mincy, 2.5 miles north of, 10 feet west of road, in limestone rock; aluminum tablet stamped "790 ADJ 1903" .....	790. 076
Forsyth, 3.5 miles south of, 4 feet west of road, in limestone boulder; aluminum tablet stamped "923 ADJ 1903" .....	923. 136
Forsyth, northeast corner of courthouse; aluminum tablet stamped "695 ADJ 1903" .....	696. 191
Walnut Shade, 250 feet north of Bull Creek, opposite post office; iron post stamped "758 ADJ 1903" .....	758. 560
Reno, 6 feet south of road, opposite post office; iron post stamped "965 ADJ 1903" .....	965. 814
Spokane, 5 feet east of public road, northwest corner of Joe Choat's store, T. 25, R. 22, sec. 13; iron post stamped "1342 ADJ 1903" .....	1, 342. 902
Tauria, 12 feet west of pond, opposite blacksmith shop; iron post stamped "1378 ADJ 1903" .....	1, 378. 917
<b>Forsyth north along public roads to Chadwick and along St. Louis &amp; San Francisco R. R. to Sparta.</b>	
Forsyth, 3 miles north of, 2 miles south of Dickens post office, in little flat 4 feet west of road, in limestone; aluminum tablet stamped "949 ADJ 1903" .....	949. 341
Taneyville, northeast corner of foundation of J. N. Ray's store; aluminum tablet stamped "1079 ADJ" .....	1, 078. 831
Taneyville, 3.25 miles north of, 200 feet east of Swan Creek, 40 feet south of small creek crossing, in boulder; aluminum tablet stamped "841 ADJ 1903" .....	841. 310
Garrison, 0.25 mile south of, 100 feet south of fifth ford of Swan Creek, in ledge; aluminum tablet stamped "876 ADJ 1903" .....	876. 518
Garrison, 2.5 miles north of, bottom of Chadwick Hill, 2 feet east of road, in limestone; aluminum tablet stamped "961 ADJ 1903" .....	961. 110
Chadwick, in northwest corner of foundation of oil warehouse, 100 feet south of and across railroad track from station, opposite Simpson's store; aluminum tablet stamped "1378 ADJ 1903" .....	1, 377. 336
Lees station (Oldfield post office), 0.25 mile south of, 7 feet north of track, in ledge; aluminum tablet stamped "1384 ADJ 1903" .....	1, 383. 373

Sparta, 300 feet north of station, 50 feet east of track, in southwest corner of foundation of flour mill; aluminum tablet stamped "1399 ADJ 1903" ... 1, 398. 301

**Spokane north along public roads to Omark.**

Highlandville, in southwest corner of foundation of building containing post office and Major's store; aluminum tablet stamped "1383 ADJ 1903". 1, 382. 818

Highlandville, 3.5 miles north of, 1.5 miles south of Sellmore, in northwest corner of chimney of W. M. Kings's house; aluminum tablet stamped "1337 ADJ 1903" ..... 1, 336. 394

Ozark, 3 miles south of, on west bank of Elk Creek, forks of road, at spring, in limestone; aluminum tablet stamped "1168 ADJ 1903" ..... 1, 167. 761

**School northeast via Jamesville to Riverdale.**

School, 3 miles northeast of, Union Ridge Church, in foundation, 13 feet north of southeast corner; aluminum tablet ..... 1, 297. 424

Jamesville, 0.6 mile east of, 0.14 mile east of road fork, 300 feet west of 3-foot oak post in field, 15 feet south of road, overhanging limestone bluff, 30 feet north of road; aluminum tablet ..... 1, 043. 062

Riverdale, flour mill on Finley Creek, limestone ledge, opposite mill, 10 feet south of west end of dam across Finley Creek; aluminum tablet... 1, 071. 421

**SPRINGFIELD QUADRANGLE.**

**Sparta along St. Louis & San Francisco R. R. to Omark.**

McCracken, 60 feet south of track, in north foundation of A. M. Candle's store; aluminum tablet stamped "1380 ADJ 1903" ..... 1, 379. 205

Ozark, in northwest corner of foundation of courthouse; aluminum tablet stamped "1178 ADJ 1903" ..... 1, 177. 000

**Riverdale northeast to Omark.**

Riverdale, 2.8 miles east of, 300 feet north of turn in road, 20 feet east of A. L. Porter's spring house; in top of ledge of limestone; aluminum tablet ..... 1, 151. 766

**Joplin District.**

**JASPER COUNTY.**

The elevations in the following list are based on bench mark "CIII" of the Coast and Geodetic Survey at Carthage, at the southwest corner of Main and Limestone streets. The bench mark is a cross cut on the rounded top of a 6 by 6 inch limestone post buried in the ground 2.3 feet west of intersection of inside lines of sidewalk. The elevation of this bench mark, as corrected by the 1907 adjustment of that Survey, is accepted as 942.000 feet above mean sea level.

The leveling was done in 1904 by D. C. Wray.

All bench marks dependent upon this datum are stamped with the letters "CRTHG" in addition to the figures of elevation.

This list includes only the Missouri portion of the levels; for additional work in the same area see results of spirit leveling in Kansas (Bulletin 472).

**JOPLIN DISTRICT.**

Carthage, at southwest corner of Main and Limestone streets; limestone post (Coast and Geodetic Survey bench mark "CIII") ..... 942. 000

Carthage, at west side of City Park, east side of Harrison Avenue, 45 feet north of north line of Chestnut Street, in south Meridian post; aluminum tablet stamped "1009 CRTHG".....	Feet. 1,008.916
Oronogo, SE. $\frac{1}{4}$ sec. 36, T. 29 N., R. 33 W., on Central Avenue, in capstone at north wing wall at west abutment of steel viaduct over Missouri Pacific Railway; aluminum tablet stamped "975 CRTHG".....	975.291
T. 28 N., R. 33 W., northwest corner of sec. 6, 1 mile northwest of Carl Junction, 100 feet east of crossroads; iron post stamped "884 CRTHG".....	884.283
Duenweg, T. 27 N., R. 32 W., southeast corner of sec. 4, 0.5 mile west of hotel, at corner of fence northwest of crossroads; iron post stamped "1075 CRTHG".....	1,075.241
T. 26 N., R. 33 W., northwest corner of sec. 9, 10 feet south of corner of fence southeast of Seneca and Box Springs crossroads; iron post stamped "1142 CRTHG".....	1,141.806
T. 29 N., R. 34 W., 1 mile east of Waco, northeast corner of sec. 13, 60 feet west and 30 feet south of cornerstone; iron post stamped "868 CRTHG".....	868.460
Alba, T. 29 N., R. 32 W., NW. $\frac{1}{4}$ sec. 15, in southwest corner of schoolhouse grounds; iron post stamped "984 CRTHG".....	984.338
Pleasant View Church, T. 29 N., R. 31 W., southeast corner sec. 12, at east end of gate into yard; iron post stamped "1006 CRTHG".....	1,006.265
Webb City, at west side of Allen Street, between Main and Daugherty Streets, in northeast corner of Exchange Bank Building; aluminum tablet stamped "1003 CRTHG".....	1,003.320
T. 27 N., R. 31 W., northeast corner of sec. 1, on south line of east-west road, 210 feet west of west line of north-south road; iron post stamped "1074 CRTHG".....	1,073.995
T. 26 N., R. 31 W., northeast corner of sec. 1, on west line of north-south road, 25 feet south of south line of east-west road; iron post stamped "1160 CRTHG".....	1,160.089
T. 26 N., R. 32 W., northeast corner of sec. 1, on south line of east-west road, 15 feet west of west line of north-south road; iron post stamped "1137 CRTHG".....	1,136.743
Joplin, at southeast corner of Virginia Avenue and Seventh Street, in northwest corner of courthouse foundation; aluminum tablet stamped "1009 CRTHG".....	1,008.486

**Aurora Special Quadrangle (Carthage and Greenfield 30' Quadrangles, and Aurora, Menett, and Ritchey 15' Quadrangles).**

**JASPER AND LAWRENCE COUNTIES.**

The elevations in the following list are based on bench marks of the Coast and Geodetic Survey at Sarcouxie and on those of the United States Geological Survey at Aurora and Marionville.

The leveling was done by G. P. Featherstone in 1909.

**AURORA SPECIAL QUADRANGLE.**

**Aurora east along St. Louis & San Francisco R. R. to Logan, thence north and west along highways to Sarcouxie.**

Aurora city hall, on north side of building, east of entrance, top of lower stone step; aluminum tablet stamped "1395 MO".....	Feet. 1,394.653
Aurora, in foundation stone of Bank Saloon, corner of Olive and Madison Streets, under first window north of entrance on Madison Street; aluminum tablet stamped "1371 ADJ 1903".....	1,370.629

	Feet.
Aurora, 1.5 miles east of, 150 feet east of road crossing at Bonanza mine, 40 feet north of railroad track, in corner of right of way fence; iron post stamped "1402".....	1, 402. 048
Marionville, 3 miles west of, 600 feet east of milepost 266, 70 feet east of county road crossing, on abutment stone southeast corner of trestle 2656; aluminum tablet stamped "1395 MO".....	1, 395. 212
Marionville, 3 miles west of, 600 feet east of mile post 266, 70 feet east of county road crossing, on abutment stone southwest corner of trestle 2656; tablet (all that remains of this tablet is the shank, the plate having been destroyed; this bench mark should not be used in adjusting line).....	1, 395. 312
Marionville, 300 feet east of station, in northeast corner of abutment stone of trestle; aluminum tablet stamped "1351 ADJ 1903".....	1, 351. 480
T. 27 N., R. 25 W., on corner stone to secs. 14, 15, 22, and 23, at T road north.	1, 342. 08
Honey Creek schoolhouse, 200 feet west of corner to secs. 15, 16, 21, and 22, T. 27 N., R. 25 W., on south side of road; iron post stamped "1295 MO".....	1, 294. 669
Aurora, 3.5 miles north of, at northwest corner of T road west, 20 feet east and 20 feet south to corner secs. 24-25 (east corner), T. 27 N., R. 26 W.; iron post stamped "Prim. Trav. Sta. No. 13 1909 MO 1280".....	1, 279. 631
T. 27 N., R. 26 W., cross on corner stone of secs. 22, 23, 26, and 27; at cross-roads.....	1, 296. 822
Aurora, 3 miles west by 5 miles north of, 10 feet east of corner to secs. 15, 16, 21, and 22, T. 27 N., R. 26 W.; iron post stamped "1200 MO".....	1, 199. 970
Aurora, 6 miles west by 5 miles north of, 20 feet north of road; iron post stamped "1258 MO".....	1, 258. 260
Mount Vernon, 5.5 miles south of, at the Thomas Hillhouse farm, set at west end of T road east; iron post stamped "Prim. Trav. Sta. No. 14 1909 MO 1191".....	1, 191. 100
T. 27 N., R. 27 W., on stone at corner of secs. 23, 24, 25, and 26.....	1, 268. 45
Mount Vernon, point 5 miles south by 3 miles west of, 30 feet northeast of corner of secs. 21, 22, 27, and 28, T. 27 N., R. 27 W.; iron post stamped "1295 MO".....	1, 295. 118
Freistatt, 1 mile north by 2 miles west of, at northeast corner of crossroads, 15 feet south and 35 feet west to west corner secs. 19-30, T. 27 N., R. 27 W., 45 feet south and 35 feet west to east corner secs. 24 and 25, T. 27 N., R. 28 W.; iron post stamped "Prim. Trav. Sta. No. 15 1909 MO 1296".....	1, 295. 652
T. 27 N., R. 28 W., 100 feet west of quarter corner of secs. 15 and 22; in root of hickory tree; nail.....	1, 292. 03
Clarkson, 1 mile east of, 25 feet southeast of corner of secs. 15, 16, 21, and 22, T. 27 N., R. 28 W.; iron post stamped "1256 MO".....	1, 255. 697
Clarkson, 1 mile north by 1 mile west of, 20 feet east of corner of secs. 7, 8, 17, and 18, T. 27 N., R. 28 W. (T road west); iron post stamped "1211 MO".....	1, 210. 770
T. 27 N., Ra. 28 and 29 W., 15 feet west of corner of secs. 7, 12, 13, and 18, in root of hickory tree; nail.....	1, 216. 85
Sarcoxie, 2.5 miles east of, 25 feet north of corner of secs. 10, 11, 14, and 15, T. 27 N., R. 29 W.; iron post stamped "1162 MO".....	1, 162. 275
T. 27 N., R. 29 W., 30 feet southeast of corner of secs. 9, 10, 15, and 16, in root of black-oak tree; nail.....	1, 167. 50
Sarcoxie, in upper surface of lower stone step of brick building owned and occupied by the Bank of Sarcoxie, on southeast corner of block opposite northeast corner of public square; bottom of a cut surrounded by letters "U. S. B. M." and "U. S. C. & G. S." The inscription "Altitude above Gulf of Mexico 1088 Ft." is also cut in the stone step.....	1, 089. 591

**Logan north and west along highways via Mount Vernon and Stotts to Searsville.**

Marionville, 2 miles east by 3 miles north of, 20 feet northeast of west corner of secs. 18 and 19, T. 27 N., R. 24 W., on Lawrence County and Christian County line; iron post stamped "1431 MO".....	Feet. 1, 430. 657
Marionville, 2 miles east by 5.7 miles north of, on Lawrence County and Christian County line, 30 feet southwest of T road east; iron post stamped "1278 MO".....	1, 278. 127
Ts. 27 and 28 N., R. 25 W., quarter corner of secs. 1 and 36, 10 feet southwest of, point painted on sandstone boulder.....	1, 307. 72
Marionville, 2 miles east by 6 miles north of, 1,000 feet southwest of east corner of secs. 24 and 25, T. 28 N., R. 25 W., 10 feet north of road, in limestone rock; aluminum tablet stamped "1180 MO".....	1, 180. 195
Chesapeake, 1 mile east of, 25 feet southeast of corner of secs. 21, 22, 27, and 28, T. 28 N., R. 25 W.; iron post stamped "1291 MO".....	1, 291. 106
Chesapeake, 2 miles west of, at southwest corner of T road west on range line, 20 feet north by 20 feet east of east corner of secs. 24 and 25, T. 28 N., R. 26 W.; iron post stamped "Prim. Trav. Sta. No. 2 1909 MO".....	1, 371. 648
Mount Vernon, 1.8 miles north of, on west side of north and south road at T road west, 15 feet west by 5 feet north of center of T road; iron post stamped "Prim. Trav. Sta. No. 3 1909 MO 1265".....	1, 265. 544
Mount Vernon, 1 mile north by 0.9 mile west of, on north side of road; iron post stamped "1223 MO".....	1, 222. 664
Big Spring Church, 50 feet northeast of road forks, in tree root; nail.....	1, 115. 71
Big Spring Church, 0.5 mile northwest of, 0.2 mile north of junction of Williams Creek and Spring River, on south side of road; iron post stamped "1103 MO".....	1, 103. 441
Stotts City, 1 mile north of, at northwest corner of crossroads, 15 feet south and 40 feet east of corner of secs. 23, 24, 25, and 26, T. 28 N., R. 28 W.; iron post stamped "Prim. Trav. Sta. No. 4 1909 MO".....	1, 169. 541
Stotts City, 2 miles north of, 50 feet southwest of corner of secs. 13, 14, 23, and 24, T. 28 N., R. 28 W., in tree root at T road west at corner; nail.....	1, 112. 48
Stotts City, 2 miles north by 2 miles west of, 20 feet southeast of corner of secs. 15, 16, 21, and 22, T. 28 N., R. 29 W.; iron post stamped "1078 MO".....	1, 078. 639
Russell station, 1.5 miles east by 0.5 mile south of, in northwest corner of pasture at southeast corner of T road east, 30 feet west and 20 feet north of west corner of secs. 18 and 19, T. 27 N., R. 28 W., 35 feet west and 20 feet north of east corner of secs. 13 and 24, T. 28 N., R. 29 W.; iron post stamped "Prim. Trav. Sta. No. 51 1909 MO 1145".....	1, 145. 086
T. 28 N., R. 29 W., 30 feet southeast of corner of secs. 15, 16, 21, and 22; iron post stamped "1030 MO".....	1, 030. 134
Ts. 27 and 28 N., R. 29 W., 75 feet northeast of corner of secs. 3, 4, 33, 34; iron post stamped "1154 MO".....	1, 154. 645

**Dearborn and Leavenworth Special (Leavenworth 15' and Kansas City 30') Quadrangles.****PLATTE COUNTY.**

The elevations in the following list are based on bench marks of the Missouri River Commission in accord with the 1907 adjustment.

The leveling was done in 1906 by S. K. Atkinson.

**LEAVENWORTH SPECIAL (KANSAS CITY 30') QUADRANGLE.****At Waldron.**

Waldron, on west side of county road, 350 feet east of tracks of Chicago, Burlington & Quincy R. R., 300 feet north of Methodist Episcopal church, in 7-ton sandstone boulder; aluminum tablet stamped "781".....	Feet. 781. 212
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**LEAVENWORTH SPECIAL (LEAVENWORTH 15) QUADRANGLE**

**Leavenworth via Beverly Junction to Platte City, thence southeast via Hampton to 2.5 miles northeast of Waldron.**

Beverly, 2,000 feet east of station, 75 feet north of tracks, at point where wagon road crosses tracks; iron post stamped "773" .....	Feet. 772. 369
Beverly, 3 miles east of, on Chicago, Rock Island & Pacific Ry., at crossing 100 feet west of bridge 646, on south side of tracks and west side of wagon road; iron post stamped "804" .....	803. 545
Platte City, 1,000 feet east of Tracy station, on Chicago, Rock Island & Pacific Ry., 50 feet north of tracks, in front of Adam Glebb's store; iron post stamped "778" .....	777. 359
Platte City, 3 miles southeast of, on Liberty wagon road at crossroads, corner opposite park schoolhouse; iron post stamped "970" .....	969. 770
Hampton, 1 mile west of, at crossroads, near Elm Grove, red brick church on southwest corner of James Wallace's land; iron post stamped "1002".	1,002. 067
Waldron, 2.5 miles northeast of, where road running south from H. Searer's place turns off to Waldron, at junction of three roads near E. F. Neiman's farm; iron post stamped "924" .....	923. 841

**Platte City north to New Market.**

Platte City, 4 miles from station, on main north-south pike, at crossroads, on corner of C. P. Ballard's farm, southeast corner of sec. 36, T. 54 S., R. 35 E.; iron post stamped "916" .....	915. 680
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**New Market West to Iatan.**

Dye, 600 feet south of post office, northeast corner of J. McCalley's place on north-south road; iron post stamped "901" .....	901. 355
Dye, 2 miles east of, 1 mile north of, at junction of east-west and north-south roads, at southwest corner of W. H. McCalley's place; iron post stamped "1056" .....	1,056. 312

**DEARBORN QUADRANGLE.****At New Market.**

New Market, 75 feet south of station, 30 feet west of tracks; iron post stamped "869" .....	868. 722
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DEPARTMENT OF THE INTERIOR  
UNITED STATES GEOLOGICAL SURVEY

GEORGE OTIS SMITH, DIRECTOR

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BULLETIN 460

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RESULTS OF SPIRIT LEVELING  
IN IOWA

1896 TO 1909, INCLUSIVE

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R. B. MARSHALL, CHIEF GEOGRAPHER

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WORK DONE IN COOPERATION WITH THE STATE OF IOWA  
FROM 1907 TO 1909, INCLUSIVE



WASHINGTON  
GOVERNMENT PRINTING OFFICE  
1911



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# RESULTS OF SPIRIT LEVELING IN IOWA, 1896 TO 1909, INCLUSIVE.

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R. B. MARSHALL, Chief Geographer.

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## INTRODUCTION.

*Scope of the work.*—All results of spirit leveling in the State of Iowa previously published by the United States Geological Survey and the results of later work are included in this report, rearranged by quadrangles. All the elevations are based on the precise-level net as adjusted in 1907 by the Coast and Geodetic Survey to a common mean sea-level datum. The part of this net which lies within or along the borders of Iowa comprises the line of the Mississippi River Commission along the eastern border of the State from Keokuk to New Albin and the precise level line of the Missouri River Commission along the western border of the State from Hamburg to near Sioux Falls, S. Dak.

*Personnel.*—The field work previous to 1903 was done under the general direction of J. H. Renshaw, geographer; that for 1903 to 1906, inclusive, under H. M. Wilson, geographer; and the later work under W. H. Herron, geographer, under the general direction of R. B. Marshall, chief geographer. The names of the various levelmen are given in the introduction to each list. The office work of computation, adjustment, and preparation of lists was done mainly by S. S. Gannett, geographer, and D. H. Baldwin, topographer, and since 1907 under the general direction of E. M. Douglas, geographer.

*Classification.*—The elevations are classified as precise or primary according to the methods employed in their determination. For precise level lines instruments and rods of the highest grade known are used, each line is run both forward and backward, and every precaution is taken to guard against error. The allowable divergence between the forward and backward lines in feet is represented by the formula  $0.017\sqrt{D}$ , in which  $D$  is the distance in miles between bench marks. For primary lines standard Y levels are used; lines are run in circuits or are closed on precise lines, with an allowable closing error represented in feet by  $0.05\sqrt{D}$ , in which  $D$  is the length of the circuit in miles, sufficient care being given the work to

maintain this standard. For levels of both classes careful office adjustments are made, the small outstanding errors being distributed over the lines.

*Bench marks.*—The standard bench marks are of two forms. The first form is a circular bronze or aluminum tablet (*C* and *E*, Pl. I), 3.5 inches in diameter and 0.25 inch thick, having a 3-inch stem, which is cemented in a drill hole in solid rock in the wall of some public building, bridge abutment, or other substantial masonry structure. The second form (*F*, Pl. I), to be set in the ground where no masonry or rock is available, consists of a hollow wrought-iron post 3.5 inches outside diameter and 4 feet long. The bottom is spread out to a width of 10 inches in order to give a firm bearing on the earth. A bronze or aluminum-bronze cap is riveted over the top of the post. A third style of bench mark with abbreviated lettering (*B* and *D*, Pl. I) is used for unimportant points. This consists of a special copper nail 1.5 inches in length driven through a copper washer 0.875 inch in diameter. The tablets as well as the caps on the iron posts are appropriately lettered, and where States have cooperated in the leveling the fact of such cooperation is indicated by the addition of the State name (*G*, Pl. I).

The numbers stamped on the bench marks described in the following pages are the elevations to the nearest foot as determined by the levelman. These numbers are stamped with 0.1875 inch steel dies on the tablets or post caps, to the left of the word "feet." The office adjustment of the notes and the reduction to mean sea level datum may so change some of the figures that the original markings are 1 or 2 feet in error. It is assumed that engineers and others who have occasion to use the bench-mark elevations will apply to the Director of the United States Geological Survey at Washington, D. C., for their adjusted values, using the markings as identification numbers only.

*Datum.*—All Geological Survey elevations are referred to mean sea level, which is the level that the sea would assume if the influence of tides and winds were eliminated. This level is not the elevation determined from the mean of the highest and lowest tides, nor is it the half sum of the mean of all the high tides and the mean of all the low tides, which is called the half-tide level. *Mean sea level is the average height of the water, all stages of the tide being considered.* It is determined from observations made by means of tidal gages placed at stations where local conditions, such as long narrow bays, rivers, and like features will not affect the height of the water. To obtain even approximately correct results these observations must extend over at least one lunar month and if great accuracy is desired they must extend over several years. At ocean stations the half-tide level and



## GEOLOGICAL SURVEY BENCH MARKS.

*A*, Tablet used in cooperating States. The State name is inserted at *G*.  
*B* and *D*, Copper temporary bench mark, consisting of a nail and copper washer.  
*A*, *C*, and *E*, Tablets for stone or concrete structures.  
*F*, Iron post used where there is no rock.



mean sea level usually differ but little. It is assumed that there is no difference between the mean sea level as determined from observations in the Atlantic Ocean, Gulf of Mexico, or the Pacific Ocean.

The connection with tidal stations for bench marks in certain areas that lie at some distance from the seacoast is still uncertain and this fact is indicated by the addition of a letter or word to the right of the word "Datum" on tablets or posts. For such areas corrections for published results will be made from time to time as the precise level lines of the Geological Survey or other Government organizations are extended.

*Topographic maps.*—Maps of the following quadrangles wholly or partly in Iowa have been published by the United States Geological Survey up to April 15, 1911. They may be obtained except as noted for 5 cents each, or \$3 a hundred, on application to the Director of the Survey at Washington, D. C.

Amana.	Marion.
Anamosa.	Mechanicsville.
Baldwin.	Milo.
Canton (S. Dak.—Iowa).	Monticello.
Cedar Rapids.	Nebraska City (Nebr.—Iowa—Mo.).
Clinton (Iowa—Ill.).	Oelwein.
Cordova (Iowa—Ill.).	Omaha and vicinity (Nebr.—Iowa) (10 cents).
Davenport (Iowa—Ill.).	Oxford.
Decorah.	Peosta (Iowa—Ill.).
Des Moines.	Rock Island (Iowa—Ill.).
Dewitt.	Savanna (Iowa—Ill.).
Durant.	Shellsburg.
Elk Point (S. Dak.—Nebr.—Iowa).	Stanwood.
Elkader (Iowa—Wis.).	Tipton.
Fairfax.	Waukee.
Farley.	Waukon (Iowa—Wis.).
Goose Lake (Iowa—Ill.).	West Liberty.
Iowa City.	Wheatland.
Kahoka (Mo.—Iowa—Ill.).	Wilton Junction.
Lancaster (Wis.—Iowa—Ill.).	Winthrop.
Leclaire (Iowa—Ill.).	
Maquoketa.	

#### PRECISE LEVELING.

**Adel, Avoca, Casey, Des Moines, Fontanelle, Harlan, Marne, Neola, Panora, Waukee, and Wiota quadrangles, and Omaha and vicinity.**

**ADAIR, CASS, DALLAS, GUTHRIE, POLK, POTTAWATTAMIE, AND SHELBY COUNTIES.**

The elevations in the following list are the results of a line of precise levels run in 1905 from the United States Army engineers' bench mark at Council Bluffs eastward along the Chicago, Rock Island & Pacific Railway to Des Moines by R. L. Libby. The elevations are referred to the 1907 adjustment.

## Omaha and vicinity.

Council Bluffs, in southwest corner of courthouse yard, 3 feet from west fence and 3 feet from south fence; permanent bench mark 348, same as 121-2, top of cap.....	Feet. 995. 370
Council Bluffs, in stone doorsill of Chicago, Milwaukee & St. Paul Ry. roundhouse, 0.3 foot from east side of door frame and same distance from front face of sill, 8 feet from southwest corner of building; permanent bench mark 343, top of copper bolt leaded vertically in stone.....	982. 010
Council Bluffs, in front of station; top of rail.....	982. 9
Council Bluffs, in south wall of post office, near southwest corner; aluminum tablet.....	1, 001. 654
Council Bluffs, 2.5 miles east of, in west pier of Chicago Great Western Ry. bridge crossing Chicago, Rock Island & Pacific Ry. and Chicago, Milwaukee & St. Paul Ry. tracks, 5 feet from ground; aluminum tablet.....	995. 520
Council Bluffs, 6 miles east of, halfway between Chicago, Rock Island & Pacific Ry. and Chicago, Milwaukee & St. Paul Ry. tracks, 6 feet north of wagon road at crossing southeast of John Slightam's house; iron post. . .	1, 020. 720
Weston, 3 miles west of, 0.25 mile south of milepost 491, in concrete culvert on east side of track; aluminum tablet.....	1, 022. 296

## NEOLA QUADRANGLE.

Weston northeast along Chicago, Rock Island & Pacific Ry. to point 0.25 mile east of Minden.

Weston, in front of station; top of rail.....	1, 037. 4
Weston, 100 feet north of Chicago, Rock Island & Pacific Ry. station, 15 feet west of track; iron post.....	1, 038. 399
Underwood, 50 feet west of track, 15 feet south of first road crossing track south of station, 50 feet southwest of telegraph pole 483-21; iron post. . .	1, 074. 973
Underwood, in first concrete culvert south of station, 20 feet east of Chicago, Rock Island & Pacific Ry. track, near telegraph pole 483-24 "G;" aluminum tablet.....	1, 073. 536
Underwood, in front of station; top of rail.....	1, 078. 4
Neola, in first concrete bridge abutment west of town (Chicago, Rock Island & Pacific Ry. bridge 483), on southeast side, 5 feet below level of track; aluminum tablet.....	1, 089. 890
Neola, at Main Street crossing of Chicago, Milwaukee & St. Paul Ry., 20 feet west of street, 10 feet south of track; iron post.....	1, 096. 820
Neola, in front of station; top of rail.....	1, 099. 7
Minden, 100 feet south of Chicago, Rock Island & Pacific Ry. track, opposite a point 120 feet west of station, 6 feet south of wagon road; iron post. .	1, 188. 345
Minden, in front of station; top of rail.....	1, 197. 8
Minden, 0.25 mile east of, in southwest concrete abutment of Chicago, Rock Island & Pacific Ry. bridge crossing the Chicago Great Western Ry. track, 2 feet from outer corner of abutment; aluminum tablet.....	1, 202. 385

## HARLAN QUADRANGLE.

Point 0.25 mile east of Minden, east along Chicago, Rock Island & Pacific Ry. to Avoca.

Shelby, 3 miles west of, in northeast stone abutment of Chicago, Rock Island & Pacific Ry. bridge 475; aluminum tablet.....	1, 290. 328
Shelby, in front of station; top of rail.....	1, 297
Shelby, 160 feet west of Chicago, Rock Island & Pacific Ry. track, opposite a point 150 feet north of station, near corner of park; iron post.....	1, 295. 654
Avoca, 3 miles northwest of, in southeast wing wall of stone culvert, third step from top; aluminum tablet.....	1, 193. 860

**AVOCA QUADRANGLE.***Avoca east along Chicago, Rock Island & Pacific Ry. to Walnut.*

Avoca, in stone water table of Avoca bank, on south side, 10 feet from southwest corner; aluminum tablet.....	Feet. 1, 159. 769
Avoca, near southwest corner of Avoca Hotel, between building and sidewalk; iron post.....	1, 156. 38
Avoca, in southwest corner of city hall lot, town bench mark, a 6-inch iron pipe open at top and filled with concrete, in which is embedded an 0.75 inch brass pipe.....	1, 166. 147
Avoca, 2 miles east of, in northwest abutment of bridge 459; aluminum tablet.....	1, 172. 039

**MARNE QUADRANGLE.***Walnut east along Chicago, Rock Island & Pacific Ry. to Atlantic.*

Walnut, 300 feet south of track opposite point on track 300 feet west of station, 5 feet southwest of second telegraph pole south of track; iron post.....	1, 286. 285
Walnut, in front of station; top of rail.....	1, 295. 8
Walnut, 2.5 miles east of, in northwest abutment of bridge 449; aluminum tablet.....	1, 287. 181
Marne, 75 feet south of track, opposite a point 100 feet west of station, 10 feet south of corner post of P. C. Meredith's yard; iron post.....	1, 185. 096
Marne, in front of station; top of rail.....	1, 194. 3
Marne, 3 miles east of, in northwest stone abutment of bridge 444; aluminum tablet (reset in 1906 by railroad engineer).....	1, 212. 1
Marne, 3 miles east of, on northeast corner of east abutment; chiseled cross..	1, 211. 18

**WIOTA QUADRANGLE.***Atlantic east along Chicago, Rock Island & Pacific Ry. to Anita.*

Atlantic, in grass plat of Chicago, Rock Island & Pacific Ry., station 200 feet east of station, 20 feet west of standpipe, 30 feet south of main track; iron post.....	1, 160. 311
Atlantic, on east side of south wing of county courthouse, 4 feet above ground; aluminum tablet.....	1, 216. 088
Atlantic, 0.5 mile east of, in southwest abutment of bridge 440, 375 feet east of road crossing; aluminum tablet.....	1, 155. 720
Wiota, 50 feet north of track, opposite point on track about 700 feet west of station; iron post.....	1, 200. 238
Wiota, in front of station; top of rail.....	1, 204. 5
Anita, 3 miles west of, in north abutment of concrete culvert, 50 feet south of wagon road near telegraph pole 428-14; aluminum tablet.....	1, 233. 213
Anita, 1 mile west of, in northeast corner of concrete culvert A-2; aluminum tablet.....	1, 244. 318
Anita, in front of station; top of rail.....	1, 257. 9
Anita, 20 feet west of entrance to Keystone Park, 150 feet south of track, opposite point 300 feet west of station; iron post.....	1, 253. 360

**FONTANELLE QUADRANGLE.***Anita northeast along Chicago, Rock Island & Pacific Ry. to Adair.*

Adair, 2.5 miles west of, in northwest abutment of bridge, near telegraph pole 420-1; aluminum tablet.....	1, 321. 798
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**CASEY QUADRANGLE.**

Adair east along Chicago, Rock Island &amp; Pacific Ry. to Casey.

Adair, 150 feet south of track, opposite point 375 feet east of station 300 feet southwest of Davenport Elevator Co.'s elevator; iron post.....	Feet. 1, 400.355
Adair, in front of station; top of rail.....	1, 405.2
Adair, 3 miles east of, in southwest abutment of bridge 402; aluminum tablet.....	1, 274.002
Casey, 2.8 miles west of, in southwest stone abutment of bridge 397; aluminum tablet.....	1, 254.485
Casey, in front of station; top of rail.....	1, 229.9
Casey, in stone foundation of T. J. Burns's store, in south wall, halfway between Main Street and alley; aluminum tablet.....	1, 249.979
Casey, 100 feet south of track, opposite point 300 feet east of station, 200 feet northwest of Lutheran Church, 3 feet east of sidewalk leading to station; iron post.....	1, 224.927

**PANORA QUADRANGLE.**

Casey east along Chicago, Rock Island &amp; Pacific Ry. to Stuart.

Menlo, 1.5 miles west of, in northwest abutment of bridge 385 (bridge over wagon road); aluminum tablet.....	1, 280.018
Menlo, in front of station; top of rail.....	1, 266.2
Menlo, 30 feet south of track, opposite point 300 feet east of station, 75 feet east of road crossing; iron post.....	1, 264.893
Stuart, in northwest corner of station grass plat, 300 feet west of station, 60 feet north of track, 1 foot east of sidewalk; iron post.....	1, 211.150
Stuart, in front of station; top of rail.....	1, 209.0
Stuart, in stone water table of high school, about 6 feet east of entrance; aluminum tablet.....	1, 207.045

**ADEL QUADRANGLE.**

Stuart east along Chicago, Rock Island &amp; Pacific Ry. to De Soto.

Dexter, in front of station; top of rail.....	1, 149.3
Dexter, in stone water table of National Bank of Dexter, on north side of building, 1 foot from northwest corner; aluminum tablet.....	1, 153.335
Dexter, 150 feet south of track, opposite point 300 feet east of station, 50 feet north of wagon road, opposite S. C. Patton & Co.'s elevator; iron post.....	1, 145.048
Earlham, 100 feet south of track opposite point on track 560 feet east of station, 150 feet south of derailling switch, 2 feet north of fence; iron post..	1, 105.188
Earlham, in front of station; top of rail.....	1, 107.1
Earlham, 1.5 miles east of, in south side of a concrete culvert, near telegraph pole 485-30; aluminum tablet.....	1, 066.576
De Soto, 1.5 miles west of, in southwest stone abutment of bridge 368; aluminum tablet.....	921.595

**WAUKEE QUADRANGLE.**

De Soto east along Chicago, Rock Island &amp; Pacific Ry. to Commerce.

De Soto, 150 feet south of track, opposite west end of station, 2 feet north of wire fence; iron post.....	889.266
De Soto, in front of station; top of rail.....	892.8
Van Meter, 60 feet north of track opposite west end of station, in grass plat, opposite a point about halfway between station and water tank, 20 feet north of road, near main street crossing; iron post.....	873.406

## PRIMARY LEVELING.

11

	Feet.
Van Meter, in front of station; top of rail.....	874.5
Van Meter, 1.25 miles east of, in southwest abutment of bridge 358; aluminum tablet.....	862.901
Booneville, 50 feet south of track, in northwest corner of field opposite point 450 feet west of station; iron post stamped "Prim. Trav. Sta. No. 9".....	858.618
Booneville, in front of station; top of rail.....	857.3
Booneville, 2 miles east of, in southwest abutment of bridge 353, aluminum tablet.....	846.155
Commerce, 2.5 miles west of, in northwest corner of concrete culvert; aluminum tablet.....	835.843
Commerce, 50 feet south of track, 75 feet southwest of first stone culvert west of station, 2 feet west of gate, in right-of-way fence, near section tool house; iron post.....	837.074
Commerce, in front of station; top of rail.....	837.5

## DES MOINES QUADRANGLE.

Commerce northeast along Chicago, Rock Island &amp; Pacific Ry. to Des Moines.

Valley Junction, 150 feet north of track, opposite point 180 feet east of station, in fence corner; iron post.....	812.271
Valley Junction, in front of station; top of rail.....	813.9
Valley Junction, 1 mile east of, 70 feet south of track, 100 feet west of right-of-way gate; iron post.....	806.924
Des Moines, 1 mile west of station, in southeast corner of park, adjoining pumping station of Des Moines Water Works Co., 100 feet north of Chicago, Milwaukee & St. Paul Ry. tracks; iron post stamped "797".....	796.560
Des Moines, in foundation stone 1 foot east of southwest corner of post office; aluminum tablet stamped "809".....	808.351
Des Moines, in northeast corner of yard adjoining city hall, 60 feet north of Locust Street; iron post stamped "804".....	803.510
Des Moines, in front of Chicago, Rock Island & Pacific Ry. station; top of rail.....	800.2

## PRIMARY LEVELING.

Decorah, Elkader, Lancaster, Oelwein, and Waukon quadrangles.

ALLAMAKEE, BUCHANAN, CLAYTON, DELAWARE, DUBUQUE, FAYETTE, AND WINNE-  
SHIEK COUNTIES.

The elevations in the following list are based on various bench marks of the Mississippi River Commission between Dubuque and New Albin. The elevation of the reference bench mark "279" at Dubuque by the 1907 adjustment is accepted as 644.949 feet above mean sea level.

The leveling in the Lancaster quadrangle was done in 1897 by C. E. Hewitt, that in the Elkader quadrangle in 1898 by G. W. Zorn and F. C. French, that in the Oelwein and Waukon quadrangles in 1899 and 1900, respectively, by Tim Burns, and that in the Decorah quadrangle was done partly in 1901-2 by John Wilson and completed in 1903 by M. A. Steele.

## LANCASTER QUADRANGLE.

Bankston southeast along highways to Lattners, thence northeast along Chicago Great Western Ry. to Sageville, thence northwest and west along highways to Holy Cross.

T. 89 N., R. 1 E., near southeast corner of sec. 16, east end of south abutment of wagon bridge over south fork of Maquoketa River; bronze tablet stamped "732 DBQ".....	Feet. 733. 714
T. 89 N., R. 1 W., NE. $\frac{1}{4}$ sec. 16, 0.8 mile south of Bankston, southwest corner of O'Connor's orchard; iron post stamped "1193 DBQ".....	1, 194. 443
T. 90 N., R. 1 W., north line of sec. 17, southeast corner of O. W. Burns's field; iron post stamped "1159 DBQ".....	1, 160. 004
T. 90 N., R. 1 E., south side of sec. 4, in ledge of rock; bronze tablet stamped "1049 DBQ".....	1, 050. 005
Sageville, T. 90 N., R. 2 E., sec. 34, on west end of north abutment of bridge over Maquoketa River, in stone; bronze tablet stamped "621 DBQ".....	622. 750
T. 91 N., R. 1 W., north side of sec. 32, junction of John Richmond's road with main wagon road; iron post stamped "1181 DBQ".....	1, 181. 309
T. 91 N., R. 1 E., in fraction of Jefferson township, near northeast corner of sec. 2, in field; iron post stamped.....	897. 928

## ELKADER QUADRANGLE.

Guttenberg northwest along highway to National, thence northeast to McGregor.

Guttenberg, northeast corner of Herder and First Streets, T. 92 N., R. 2 W.; aluminum tablet stamped "630 DBQ".....	631. 803
T. 93 N., R. 2 W., near north line of sec. 31, in school grounds; iron post stamped "681 DBQ".....	682. 254
Garnaville, SE. $\frac{1}{4}$ sec. 18, T. 93 N., R. 3 W., southeast corner of park; iron post stamped "1065 DBQ".....	1, 066. 960
T. 94 N., R. 3 W., SW. $\frac{1}{4}$ sec. 8, northwest corner of schoolhouse yard; iron post stamped "699 DBQ".....	700. 435
T. 95 N., R. 3 W., SE. $\frac{1}{4}$ sec. 33, southwest corner of schoolhouse; iron post stamped "1103 DBQ".....	1, 104. 874

National west along highway to point near Wagner, thence south to Mederville, thence east to Guttenberg.

National, SE. $\frac{1}{4}$ sec. 15, T. 94 N., R. 4 W., in southwest corner of schoolhouse yard; iron post stamped "1110 DBQ".....	1, 111. 636
Farmersburg, crossing south of station; top of rail.....	905. 6
T. 94 N., R. 5 W., southwest corner of sec. 15, southwest corner of schoolhouse yard; iron post stamped "1177 DBQ".....	1, 178. 716
Elkader, in front of station; top of rail.....	724. 7
Elkader, sec. 23, T. 93 N., R. 5 W., northeast corner of courthouse yard; iron post stamped "759 DBQ".....	760. 220
Mederville, SW. $\frac{1}{4}$ sec. 22, T. 92 N., R. 5 W., southwest corner of schoolhouse yard; iron post stamped "767 DBQ".....	768. 200
T. 92 N., R. 4 W., SW. $\frac{1}{4}$ sec. 16, in southeast corner of schoolhouse yard; iron post stamped "929 DBQ".....	930. 828
T. 92 N., R. 3 W., SW. $\frac{1}{4}$ sec. 9, in schoolhouse grounds; iron post stamped "959 DBQ".....	960. 400

Mederville south along highway to Manchester.

T. 91 N., R. 5 S., quarter corner south side of sec. 16; iron post stamped "1240 DBQ".....	1, 241. 990
T. 90 N., R. 5 W., southwest corner of sec. 21; iron post stamped "1016 DBQ".....	1, 017. 470

**T. 90 N., R. 5 W., sec. 21, east along highway to Luxemburg, thence north to Turkey River.**

	Feet.
Greeley, sec. 20, T. 90 N., R. 4 W.; iron post stamped "1142 DBQ".....	1, 143. 933
T. 90 N., R. 3 W., quarter corner east side of sec. 28, southeast corner of schoolhouse yard; iron post stamped "1090 DBQ".....	1, 091. 320
Luxemburg, sec. 21, T. 90 N., R. 2 W., in Catholic churchyard; iron post stamped "1179 DBQ".....	1, 180. 816

**Garnaville east to Clayton Center (double-spur line).**

Clayton Center, sec. 9, T. 93 N., R. 4 W., southeast corner of school yard; iron post stamped "1038 DBQ".....	1, 039. 058
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**Turkey River west along highway to sec. 16, T. 92 N., R. 4 W.**

Millville, northwest corner of sec. 15, T. 91 N., R. 2 W.; iron post stamped "638".....	639. 490
T. 91 N., R. 3 W., near center of sec. 13, 100 feet east of junction of roads; iron post stamped "897".....	898. 350
T. 91 N., R. 4 W., northwest corner of sec. 22, at northwest corner of schoolhouse; iron post stamped "1168".....	1, 169. 050

#### OEIWEIN QUADRANGLE.

**Mederville west along highway to Westgate, thence north 6 miles, thence east to Randalia.**

Osborne, at crossing; top of rail.....	753. 2
Volga, at crossing; top of rail.....	790. 1
Volga, in southeast corner of school yard; iron post stamped "794 DBQ".....	795. 343
Arlington, northeast corner of sec. 28, T. 92 N., R. 7 W.; iron post stamped "1080 DBQ".....	1, 081. 371
T. 92 N., R. 8 W., northeast corner of sec. 21; in school yard; iron post stamped "1168".....	1, 169. 116
Maynard, northeast corner of sec. 21, T. 92 N., R. 9 W.; iron post stamped "1164 DBQ".....	1, 165. 362
Maynard, 120 feet south of station, at crossing; top of rail.....	1, 102. 2
Randalia, southeast corner sec. 16, T. 93 N., R. 9 W.; iron post stamped "1128 DBQ".....	1, 129. 282

**Maynard north to Randalia, thence east along highway and Chicago, Milwaukee & St. Paul Ry. to Volga.**

Randalia, in front of station; top of rail.....	1, 103. 8
Albany, sec. 14, T. 93 N., R. 8 W., 1,100 feet north of school building, iron post stamped "930 DBQ".....	931. 937
Wadena, in front of station; top of rail.....	874. 1
Wadena, in front of station; iron post stamped "874 DBQ".....	874. 685

**Volga north into Marion township, thence west via Elgin and West Union to R. 10 W., thence south 6 miles to point 5 miles west of Randalia.**

T. 93 N., R. 6 W., NE. $\frac{1}{4}$ sec. 21, southeast corner of school yard; iron post stamped "1147 DBQ".....	1, 148. 933
T. 94 N., R. 6 W., NE. $\frac{1}{4}$ sec. 33, northeast corner of school yard; iron post stamped "876 DBQ".....	877. 785
Elgin, in front of station; top of rail.....	835. 3
T. 94 N., R. 7 W., SE. $\frac{1}{4}$ sec. 16, in school yard; iron post stamped "989 DBQ".....	990. 126
Clermont, in front of station; top of rail (on spur line).....	854. 8
West Union, south meridian stone in county fair grounds; aluminum tablet stamped "111 DBQ".....	1, 112. 362

# 14 SPIRIT LEVELING IN IOWA, 1896 TO 1909, INCLUSIVE.

West Union, corner Main and Walnut Streets, coping stone south wall of building of public school; aluminum tablet stamped "1186 DBQ".....	Feet. 1,187. 770
West Union, in front of Chicago, Milwaukee & St. Paul Railway station; top of rail.....	1,104. 8
West Union, at junction of Chicago, Milwaukee & St. Paul Railway with Chicago, Rock Island & Pacific Railway.....	1,106. 9
West Union, in front of Chicago, Rock Island & Pacific Railway station; top of rail.....	1,106. 1
T. 94 N., R. 9 W., NE. $\frac{1}{4}$ sec. 16, at road crossing; iron post stamped "1194 DBQ".....	1,195. 642
Hawkeye (on spur line), in front of station of Chicago, Milwaukee & St. Paul Railway; top of rail.....	1,176. 7

## Volga south via Strawberry Point and Dundee to Manchester.

T. 91 N., R. 6 W., quarter corner north side of sec. 21; iron post stamped "1221 DBQ".....	1,222. 544
Strawberry Point, in front of station; top of rail.....	1,217. 4
Dundee, at railroad station; iron post stamped "997 DBQ".....	998. 047
Dundee, in front of station; top of rail.....	998. 2
Manchester, in front of station; top of rail.....	942. 1

## Strawberry Point west along highway to Oelwein, thence south to Hazelton, thence east to Dundee.

T. 91 N., R. 7 W., NE. $\frac{1}{4}$ sec. 21, in school yard; iron post stamped "114 DBQ".....	1,115. 011
T. 91 N., R. 8 W., NE. $\frac{1}{4}$ sec. 21, at crossroads; iron post stamped "1143 DBQ".....	1,144. 585
Oelwein, in north wall of post office, coping stone; aluminum tablet stamped "1044 DBQ".....	1,045. 547
Hazelton, at railroad station; iron post stamped "995 DBQ".....	996. 874
T. 90 N., R. 8 W., NE. $\frac{1}{4}$ sec. 21, at side of wagon road; iron post stamped "1063 DBQ".....	1,064. 169
T. 90 N., R. 7 W., NE. $\frac{1}{4}$ sec. 21, at road crossing; iron post stamped "1061 DBQ".....	1,062. 151
Lamont, in front of station; top of rail.....	1,045. 8

## WAUKON QUADRANGLE.

### North McGregor west along highway to Monona, thence northeast to point near Reesville, thence southeast to Waukon Junction.

North McGregor, 2 miles west of, at top of Hatch Hill, on south side of road, in northwest corner of yard at residence of J. K. Gray; iron post stamped "1096 DBQ".....	1,097. 164
Watson, 0.2 mile northwest of corner of sec. 4, T. 95 N., R. 4 W., 13 feet north of corner fence post at intersection of roads; iron post stamped "1179 DBQ".....	1,180. 247
Monona, in front of Chicago, Milwaukee & St. Paul Ry. station; top of rail.	1,215. 9
T. 95 N., R. 5 W., 0.2 mile north of center of sec. 10, 60 feet north of railroad track, southeast of Walsh's house; iron post stamped "1184 DBQ".	1,185. 844
T. 96 N., R. 5 W., 700 feet east of quarter corner west side of sec. 23, north side of Hickory Creek, 80 feet southwest of northwest corner of bridge 16, south side of road; iron post stamped "787 DBQ".....	788. 051
T. 96 N., R. 4 W., south of quarter corner west side of sec. 8, on summit of hill north of Yellow River; iron post stamped "1099 DBQ".....	1,100. 940
T. 96 N., R. 4 W., 1,000 feet west of southeast corner of sec. 2, in northeast corner of schoolhouse No. 1; iron post stamped "1137 DBQ".....	1,138. 125

**Harpers Ferry northwest along highway to Dalby, thence west to Waukon, thence 3 miles north to Iron Mines, thence east to Village Creek.**

T. 97 N., R. 3 W., quarter mile south of center of sec. 16, northeast of junction of roads; iron post stamped "1061 D".....	Feet. 1,062.274
T. 98 N., R. 3 W., at quarter corner east side of sec. 31, near northwest corner of fence post of cemetery; iron post stamped "1148 DBQ".....	1,150.240
Elon, 2,500 feet east of, quarter mile east of center of sec. 83, T. 98 N., R. 4 W., northeast of fence post northeast of schoolhouse; iron post stamped "1238 DBQ".....	1,239.026
T. 97 N., R. 5 W., quarter corner west side of sec. 16, just off the highway, northeast corner of crossroads; iron post stamped "1218 DBQ" (on spur line).....	1,219.628
T. 98 N., R. 5 W., 1,300 feet northeast of center of sec. 17, 15 feet southeast of northwest corner post of north fence line; iron post stamped "1320 DBQ".....	1,321.349
T. 98 N., R. 4 W., sec. 19, 200 feet east of bridge over small tributary of Village Creek, on north side of road and south side of fence; iron post stamped "834 DBQ".....	835.810
Village Creek post office, near northwest corner of schoolhouse; iron post stamped "646 DBQ".....	647.372

**Lansing west along highway to T. 99 N., R. 5 W., thence north to point near Dorchester, thence east to New Albin.**

Lansing, northeast of intersection of Main and Second streets, near southwest corner of implement warehouse of Nielande & Co.; aluminum tablet stamped "653 DBQ".....	654.843
T. 99 N., R. 4 W., on east side of sec. 20, 12 feet west of northeast corner post of cemetery; iron post stamped "1216 DUBQ".....	1,217.883
T. 99 N., R. 5 W., near quarter corner on north side of sec. 21, northwest of schoolhouse, 25 feet south of fence corner post; iron post stamped "1060 DUBQ".....	1,061.188
New Albin schoolhouse, 22 feet northeast of northeast corner of; iron post stamped "652 DUBQ".....	653.377
T. 100 N., R. 5 W., north of quarter corner east side of sec. 16, 60 feet south of southeast corner of schoolhouse, north side of road; iron post stamped "842 DUBQ".....	843.868

#### DECORAH QUADRANGLE.

**Monona west along highway to Postville, thence north to Union Prairie, thence east to Iron Mines.**

T. 95 N., R. 6 W., NE. $\frac{1}{4}$ sec. 16, in southeast corner of school yard; iron post stamped "1075 DBQ".....	1,075.826
Postville, in front face of Commercial House; aluminum tablet stamped "1195 DBQ".....	1,194.816
Postville, in front of Chicago, Milwaukee & St. Paul Ry. station; top of rail.....	1,197.6
Lybrand, T. 96 N., R. 6 W., southwest corner of schoolhouse yard; iron post stamped "1186 DBQ".....	1,185.954
T. 97 N., R. 6 W., center, 20 feet west of road intersection on north side of, at Center schoolhouse; iron post stamped "1169 DBQ".....	1,169.180

**Union Prairie north to Dorchester, thence west to sec. 19, T. 100 N., R. 9 W., thence south to Bluffton, thence east to Springwater, thence north to Hespa.**

T. 98 N., R. 6 W., southeast corner of sec. 9, in southwest corner of West Ridge school yard; iron post stamped "1254 DBQ".....	1,253.837
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T. 99 N., R. 6 W., about 0.2 mile north of southeast corner of sec. 9, in northwest corner of school yard; iron post stamped "731 DBQ".....	Feet. 729. 928
T. 100 N., R. 6 W., NW. $\frac{1}{4}$ sec. 23, 1 mile west of Dorchester, northwest of road intersection by cemetery; iron post stamped "1087 DBQ".....	1, 087. 175
T. 100 N., R. 7 W., southeast corner of sec. 16, 2 miles north of Highlandville, northwest corner of road crossing; iron post stamped "1136 DBQ".	1, 136. 183
T. 100 N., R. 8 W., southeast corner of sec. 16, 10 feet north of northwest corner of road crossing; iron post stamped "1264 DBQ".....	1, 264. 185
T. 100 N., R. 9 W., quarter corner on east side of sec. 21, in southwest corner of Ward schoolhouse yard; iron post stamped "1213 DBQ".....	1, 213. 123
T. 99 N., R. 9 W., southeast corner of sec. 16, in northeast corner of school yard; iron post stamped "1139 DBQ".....	1, 139. 510
T. 99 N., R. 8 W., 0.25 mile east of southwest corner of sec. 21, northwest of road intersection; iron post stamped "1148 DBQ".....	1, 148. 705
<b>Springwater east 6 miles, thence north via Highlandville to center of T. 100 N., R. 7 W.</b>	
T. 99 N., R. 7 W., sec. 15, 1 rod east of northeast corner of intersection of Locust and Sattre Roads; iron post stamped "1159 DBQ".....	1, 159. 293
<b>T. 96 N., from center of range 6 W. to center of range 8 W., thence south to Nordness, T. 97 N., thence east to Ludlow.</b>	
T. 98 N., R. 7 W., 0.4 mile west of southeast corner of sec. 16, 2 rods north of northwest corner of road intersection; iron post stamped "845 DBQ".	845. 105
T. 97 N., R. 8 W., NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 15, 0.5 mile south of Nordness, 3 rods north of crossing and road intersection, 2 feet east of right of way of Chicago, Rock Island & Pacific Ry.; iron post stamped "1059 DBQ"...	1, 059. 282
T. 97 N., R. 7 W., near center of sec. 15, northwest of road junction, in southeast corner of McKay school yard; iron post stamped "1144 DBQ".	1, 144. 427
<b>Center of T. 96 N., R. 8 W., west 5 miles, thence north to sec. 25, T. 99 N., R. 7 W.</b>	
Decorah, in front of Chicago, Rock Island & Pacific Ry. station; top of rail.....	861. 6
Decorah, in front of Chicago, Milwaukee & St. Paul Ry. station; top of rail.....	863. 5
Decorah, SE. $\frac{1}{4}$ sec. 16, T. 98 N., R. 8 W., in foundation of jail at northeast corner, 3 feet above ground; bronze tablet stamped "904 DBQ".....	904. 502
<b>Line continued west from Decorah to sec. 8, T. 96 N., R. 9 W., thence south to sec. 18, T. 97 N., R. 9 W., near Spillville, thence east to Nordness.</b>	
McIntosh schoolhouse, 1.25 miles west of, 1.25 miles east of Madison church, east of entrance to cemetery; iron post stamped "1194 DBQ".....	1, 193. 975
Conover, in front of station; top of rail.....	1, 235. 6
Conover, sec. 15, T. 97 N., R. 9 W., north of front entrance to village hall; iron post stamped "1233 DBQ".....	1, 233. 799
<b>McKay schoolhouse, sec. 15, T. 97 N., R. 7 W., south to Castolia, thence west to R. 10 W., thence south to sec. 13, T. 96 N., R. 10 W., thence east to Portville.</b>	
Castolia, in southwest corner of school yard; iron post stamped "1251 DBQ".....	1, 251. 444
Ossian, sec. 11, T. 96 N., R. 8 W., at Catholic Church, east side of north-south road, north side of east-west road; iron post stamped "1263 DBQ"...	1, 263. 519
Fort Atkinson, sec. 7, T. 96 N., R. 9 W., west side of town, in northwest corner of church yard; iron post stamped "1019 DBQ".....	1, 020. 021
T. 95 N., R. 9 W., 0.4 mile north by 0.1 mile west of southeast corner of sec. 22, opposite road intersection by east-west road, east side; iron post stamped "1151 DBQ".....	1, 152. 724

T. 95 N., R. 8 W., 0.5 mile north of center of sec. 21, in school yard; iron post stamped "983 DBQ".....	Feet. 983.938
Clermont, in sec. 34, T. 95 N., R. 7 W., in northeast corner of school yard; iron post stamped "861 DBQ".....	862.081

**Farley and Peosta quadrangles.****DELAWARE, DUBUQUE, JONES, AND LINN COUNTIES.**

The elevations in the following list are based on bench mark "279" of the Mississippi River Commission, in the northeast corner of the customhouse at Dubuque, a copper bolt marked "U. S. P. B. M.," the elevation of which is now accepted as 644.949 feet above mean sea level. The elevations published for these bench marks in the appendix to the eighteenth annual report are unreliable. Many gross errors have been corrected in connection with the later leveling in the Elkader quadrangle and the following list results from a new adjustment.

The leveling was done by G. W. Newell in 1896.

The elevations given for the points marked with an asterisk (\*) are not reliable but are included in order to complete the list.

**PEOSTA QUADRANGLE.****Dubuque southwest to Fillmore.**

Dubuque, northeast corner of Grandview and Dodge streets; iron post stamped "875".....	Feet. 874.596
T. 88 N., R. 2 E., SW. $\frac{1}{4}$ sec. 15, south side of road. 60 feet from center of porch; iron post stamped "1071".....	1,071.024
T. 87 N., R. 1 E., SE. $\frac{1}{4}$ sec. 11, northeast corner of frame building formerly used for saloon at junction of roads going south (formerly Melleray post office, commonly called the "Corners"); iron post stamped "1065"....	1,065.683
T. 87 N., R. 1 W., at quarter section line of sec. 25, Whitewater township, road crossing Chicago, Milwaukee & St. Paul Ry., near north end of second tie from east cattle guard; iron post stamped "889".....	879.694

**Fillmore east to Lamotte, thence north to Dubuque.**

*Butler township, sec. 1, T. 86 N., R. 1 E., south side of road crossing north line of Chicago, Milwaukee & St. Paul Ry., fence corner near William Cannon's gate, 20 feet southeast of cattle guard; iron post stamped "868".....	858.544
*Otter Creek township, sec. 2, T. 86 N., R. 2 E., road crossing Chicago, Milwaukee & St. Paul Ry., near west section line, 10 feet south of track; iron post stamped "921".....	912.486
*Zwingle station, sec. 35, T. 87 N., R. 2 E., Chicago, Milwaukee & St. Paul Ry., west end of platform; iron post stamped "902".....	894.077
*Lamotte, sec. 4, T. 86 N., R. 3 E., corner Market and Water Streets, 40 feet northeast of railroad; iron post stamped "923".....	914.761
*Bellevue township, Jackson County, T. 86 N., R. 4 E., SW. $\frac{1}{4}$ sec. 6, junction of wagon roads near Anton Ernest's house; iron post stamped "708".....	700.249
*T. 87 N., R. 3 E., sec. 22, southeast corner Nat Mandor's shed, west side of road, 200 feet southwest of bridge over Tete des Morts River, on half section line; iron post stamped "718".....	709.929



Beaver Creek, 1.6 miles north of, NE. $\frac{1}{4}$ sec. 7, T. 79 N., R. 24 W., northeast corner Lawson schoolhouse; iron post stamped "833 ADJ 1903".....	Post. 832.943
Ridgedale schoolhouse, near center sec. 36, T. 80 N., R. 25 W., southeast corner school yard, opposite road south; iron post stamped "959 ADJ 1903".....	868.965
Corydon Bridge, 1 mile west of, about center of sec. 14, T. 80 N., R. 25 W., 40 feet west of center of road, in A. L. Frazer's yard; iron post stamped "950 ADJ 1903".....	949.972
Des Moines southeast over Chicago, Rock Island & Pacific Ry. to Levey, thence north and west along highway via Berwick and Ankeny to Corydon Bridge.	
Des Moines, railroad bridge over Des Moines River, north face of coping, 2 feet west of east end of pier on south bank, southwest corner of sec. 6, T. 78 N., R. 24 W.; aluminum tablet stamped "797 ADJ 1903".....	796.206
Levey, 15 feet west of road, 175 feet northwest of E. S. Irwin's house; iron post stamped "Prim. Trav. Sta. No. 7 782 ADJ 1903".....	781.515
Youngstown, center of south side of sec. 5, T. 78 N., R. 23 W., railroad bridge over Four Mile Creek, west face of coping stone above east pier; aluminum tablet stamped "796 ADJ 1903".....	795.172
Bowsher station, 0.8 mile south of, bridge over Four Mile Creek, in south side of east abutment; aluminum tablet stamped "821 ADJ 1903".....	820.296
Berwick, 200 feet north of station, east of road, 20 feet north of elm; iron post stamped "841 ADJ 1903".....	840.931
Berwick, 1.6 miles north of, 150 feet southwest of brick house, 100 feet northeast of fork of road; iron post stamped "942 ADJ 1903".....	941.889
T. 80 N., R. 23 W., southeast corner of sec. 19, 2.5 miles west by 1 mile south of, 40 feet northwest of center of crossroads; iron post stamped "938 ADJ 1903".....	937.837
Ankeny, Methodist Episcopal Church, in foundation stone facing east and 2 feet south of north main entrance door; aluminum tablet stamped "997 ADJ 1903".....	996.799
Ankeny, 1 mile north by 1.5 miles west of, 100 feet west of southeast corner of field, in southeast corner sec. 9; iron post stamped "Prim. Trav. Sta. No. 4".....	963.546
T. 80 N., R. 24 W., NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 18, 150 feet west of road fork, Corydon Bridge; iron post stamped "850 ADJ 1903".....	849.913

## Waukee quadrangle.

## DALLAS AND POLK COUNTIES.

The elevations in the following list are based upon an iron bench mark post 60 feet north of the Chicago, Rock Island & Pacific Railway track, near the Main Street crossing, at Van Meter and an iron bench mark post 50 feet south of track, 75 feet southwest of the first stone culvert west of the station, at Commerce. The elevations of these bench marks by the 1907 adjustment are, respectively, 873.406 and 837.074 feet above mean sea level, as determined by an unadjusted line of precise levels from Council Bluffs to Des Moines.

The leveling was done in 1906 by W. A. Gelbach and F. H. West.

## WAUKEE QUADRANGLE.

Van Meter north to Ortonville, thence east to Campbell, thence south to Commerce.

	Feet.
T. 78 N., R. 27 W., northwest corner of sec. 10, 20 feet west of, 4 feet north of corner fence post by roadside; iron post stamped "983".....	982. 357
Ortonville, 30 feet southeast of quarter corner north side of sec. 35, T. 79 N., R. 27 W., 4 feet south of corner fence post; iron post stamped "1037".	1, 036. 985
Waukee, 35 feet southeast of northwest corner of sec. 33, T. 79 N, R. 26 W., 4 feet south of corner fence post; iron post stamped "1035".....	1, 034. 817
Pleasant View schoolhouse, T. 79 N., R. 26 W., 35 feet northeast of northwest corner of sec. 36, 8 feet east of corner fence post, in school yard; iron post stamped "1032".....	1, 031. 227
T. 78 N., R. 25 W., 40 feet northwest of northwest corner of sec. 8, in corner of school yard; iron post stamped "950".....	949. 675

## Ortonville to Adel (double-rodged line).

Adel, in southeast corner of courthouse yard, 2 feet from either side of angle formed by sidewalks; iron post (Prim. Trav. Sta. No. 11).....	892. 391
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Ortonville north to sec. 23, T. 80 N., R. 27 W., thence northeast to sec. 12, T. 80 N., R. 26 W., thence southeast to Campbell.

T. 79 N., R. 27 W., northeast corner of NW. $\frac{1}{4}$ sec. 14, in corner of lot at southwest corner of junction of crossroads, 10 feet from either road; iron post stamped "1049".....	1, 048. 306
Dallas Center, T. 79 N., R. 27 W., sec. 2, in east face of Citizen's Bank, 27 feet from south edge; aluminum tablet stamped "1073".....	1, 072. 985
T. 80 N., R. 27 W., northwest corner of SW. $\frac{1}{4}$ sec. 23, in corner of field at southeast corner of crossroads, 15 feet from either road and 3 feet from side of fence around field; iron post stamped "1024".....	1, 023. 376
T. 80 N., R. 26 W., southeast corner of NE. $\frac{1}{4}$ sec. 19, in corner of field at northwest corner of T road, 10 feet from either road, 3 feet from either side of fence around field; iron post stamped "1029".....	1, 028. 993
T. 80 N., R. 26 W., northeast corner of NE. $\frac{1}{4}$ sec. 16, in corner of lot at southwest corner of crossroads; iron post stamped "970".....	969. 443
T. 80 N., R. 26 W., southeast corner of SE. $\frac{1}{4}$ sec. 12, in corner of field, Dallas County, 2.5 feet from county line, on C. E. Waters place, 200 yards east of house; iron post stamped "867".....	867. 142
T. 80 N., R. 25 W., southwest corner of NE. $\frac{1}{4}$ sec. 20, northeast corner of schoolhouse yard; iron post stamped "881".....	880. 221
T. 80 N., R. 25 W., northwest corner of NW. $\frac{1}{4}$ sec. 34, in field opposite junction of T roads; iron post stamped "885".....	884. 280
T. 79 N., R. 25 W., southeast part of SE. $\frac{1}{4}$ sec. 4, in brick foundation on west side of schoolhouse, 150 yards west of intersection of section lines secs. 3, 4, 9, and 10; aluminum tablet stamped "976".....	975. 226
T. 79 N., R. 25 W., southeast corner of SE. $\frac{1}{4}$ sec. 21, 20 feet west of junction T road south, in field, 20 feet from large tree at corner; iron post stamped "956 Prim. Trav. Sta. No. 2".....	955. 389

## Charlton, Indianola, and Milo quadrangles.

## MARION AND WARREN COUNTIES.

The elevations in the following list are based on a bench mark at Levey in the Des Moines quadrangle, and upon the 1907 adjustment datum.

The leveling was done in 1907 by W. A. Gelbach.

## MILO QUADRANGLE.

Levey southeast along Chicago, Burlington & Quincy R. R. to Carlisle, thence south along roads to northwest corner of sec. 3, T. 74 N., R. 23 W.

	Feet.
Carlisle, in front of station; top of rail .....	785. 2
Carlisle station, at side of road 200 feet east of tracks, limestone rock 8 by 8 by 30 inches, set 28 inches in ground; aluminum tablet stamped "782 ADJ" .....	782. 564
T. 77 N., R. 23 W., sec. 23, southwest corner of, at northeast corner of crossing, limestone rock 8 by 9 by 32 inches, set 30 inches in ground; aluminum tablet stamped "914 ADJ" .....	913. 891
T. 76 N., R. 23 W., center of NE. $\frac{1}{4}$ sec. 10, west side of road, opposite T road to east, limestone rock 5 by 8 by 28 inches, set 27 inches in the ground; aluminum tablet stamped "931 ADJ" .....	931. 189
Ackworth, 0.75 mile west of, at southeast angle of forks of road, limestone rock 8 by 8 by 30 inches, set 29 inches in ground; aluminum tablet stamped "943 ADJ" .....	942. 264
T. 75 N., R. 23 W., sec. 10, 0.25 mile west of northeast corner of, 4 feet west of corner post, at southwest angle of road forks, limestone rock 8 by 9 by 32 inches; aluminum tablet stamped "958 ADJ" .....	958. 178
T. 75 N., R. 23 W., sec. 23, west of center of, 1.75 miles west of Milo at southwest corner of crossroads, 10 feet south of corner post; in limestone rock; 6 by 8 by 30 inches, set 29 inches in ground, aluminum tablet stamped "896 ADJ" .....	895. 377
St. Mary's Catholic Church north via Sandyville to Ford station, thence northwest to Levey.	
T. 75 N., R. 22 W., northeast corner of sec. 26, 2 miles west of Caloma, in southwest angle of crossroads, 50 feet west by 30 feet south of corner; in limestone rock 6 by 10 by 30 inches, set 28 inches in ground; aluminum tablet stamped "966 ADJ" .....	966. 179
T. 35 N., R. 22 W., southeast corner of sec. 3, 1 mile west of Motor, northwest angle of crossroads, sandstone rock 8 by 10 by 24 inches, set 23 inches in ground; aluminum tablet stamped "943 ADJ" .....	942. 926
Sandyville, 300 feet south of main crossroads, west side of road at fence behind hitching rack, limestone rock 8 by 8 by 32 inches, set 30 inches in ground; aluminum tablet stamped "941 ADJ" .....	941. 721
T. 76 N., R. 22 W., center of SW. $\frac{1}{4}$ sec. 4, west of road opposite T road east, limestone rock 6 by 8 by 33 inches, set 32 inches in ground; aluminum tablet stamped "773 ADJ" .....	773. 575
Hartford, at south edge of town, southeast angle of T road east, sandstone rock 8 by 10 by 20 inches, set 19 inches in ground; aluminum tablet stamped "888" .....	888. 171
Northeast corner sec. 36, T. 75 N., R. 23 W., east to Caloma, thence northeast along road to Pleasantville, thence northwest along Chicago, Burlington & Quincy R. R. to Ford station.	
T. 75 N., R. 21 W., northwest corner of sec. 20, 1 mile north of Caloma, at southeast angle of crossroads, limestone rock 8 by 10 by 24 inches, set 22 inches in ground; aluminum tablet stamped "936 ADJ" .....	935. 698
T. 75 N., R. 21 W., west of southeast corner of sec. 5, northwest angle of crossroads, in limestone rock 6 by 8 by 28 inches set 27 inches in ground; aluminum tablet stamped "869 ADJ" .....	868. 704
T. 76 N., R. 21 W., northeast corner of sec. 33, 2.5 miles south of Pleasantville, in southwest angle of crossroads, at northeast corner of schoolhouse, sandstone rock 8 by 10 by 22 inches, set 21 inches in ground; aluminum tablet stamped "894 ADJ" .....	894. 119

Pleasantville, 0.75 mile southeast of, 230 feet northwest of road crossing, in top of east end of railroad culvert; primary traverse station 3; aluminum tablet stamped "882 ADJ".....	Feet. 881. 347
Pleasantville, in front of station; top of rail.....	927. 4
Wheeling, 0.75 mile east of, north side of road, 120 feet west of track at road crossing; iron post stamped "910 ADJ".....	909. 872
Swan station, 100 feet south of, 55 feet west of track, 5 feet south of sidewalk, in corner of grass plot; iron post stamped "772 ADJ".....	772. 050
Swan station, in front of; top of rail.....	764. 3
Ford, 0.75 mile northeast of, in top of southeast pier of south span of highway bridge over Des Moines River; aluminum tablet stamped "Prim. Trav. Sta. No. 1, 763 ADJ".....	762. 635
Swan northeast along road to highway bridge over Des Moines River and return (Spar line).	

Percy, 1.5 miles west of, 100 feet west of road, in south part of W. C. Wilson's yard, 1 foot north of Wabash R. R. fence at crossing south to highway bridge over Des Moines River, sandstone rock 5 by 20 by 26 inches; set 22 inches in ground; aluminum tablet stamped "774 ADJ".....	773. 828
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## INDIANA QUADRANGLE.

SW.  $\frac{1}{4}$  sec. 16, T. 76 N., R. 23 W.

T. 76 N., R. 23 W., southwest corner of sec. 16, northeast angle of crossroads, limestone rock; aluminum tablet stamped "948 ADJ".....	947. 812
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## CHARITON QUADRANGLE.

Northwest corner of sec. 3, T. 74 N., R. 23 W., east by road to St. Mary's Catholic Church.

T. 74 N., R. 23 W., northwest corner of sec. 3, 30 feet south by 60 feet east of crossroads, in limestone rock; aluminum tablet stamped "Prim. Trav. Sta. No. 6, 937 ADJ".....	936. 347
T. 74 N., R. 23 W., northeast corner of sec. 1, southwest angle of crossroads; in limestone rock 8 by 8 by 33 inches, set 32 inches in ground; aluminum tablet stamped "977 ADJ".....	977. 674
T. 75 N., R. 22 W., southwest corner of sec. 35, at St. Mary's Catholic Church, 6 feet east of cottonwood tree at northeast angle of crossroads, in limestone rock; aluminum tablet stamped "Prim. Trav. Sta. No. 5, "926 ADJ".....	925. 701

## Attica and Knoxville quadrangles.

## MARION COUNTY.

The elevations in the following list are based on a bench mark at Levey, in the Des Moines quadrangle, and upon the 1907 adjustment datum.

The leveling was done in 1908 by G. E. Heebink.

## KNOXVILLE QUADRANGLE.

Point 0.75 mile southeast of Pleasantville east by road to Mount Vernon Chapel.

Pleasantville, 0.75 mile southeast of, 230 feet northwest of road crossing, in top of east end of railroad culvert; aluminum tablet stamped "Prim. Trav. Sta. No. 3, 882 ADJ".....	Feet. 881. 347
T. 76 N., R. 21 W., 0.5 mile south of northwest corner of sec. 14, at northeast angle of crossroads, on stone; painted cross.....	916. 76

T. 76 N., R. 20 W., center of sec. 18, north of east and west road, 25 feet west of corner fence post, 1 foot south of fence; iron post stamped "913 IOWA".....	Feet. 912.782
T. 76 N., R. 20 W., 0.5 mile south of northeast corner of sec. 18, in center of road, in root of white elm tree 32 inches in diameter; nail.....	908.98
T. 76 N., R. 20 W., southwest corner of sec. 15, 28 feet north and east of center of crossroads, 3 feet west of fence, 10 feet north of corner fence post; iron post stamped "781 IOWA".....	780.879
T. 76 N., R. 20 W., 0.25 mile west of northeast corner of sec. 24, west and 130 feet south of center of crossroads, 40 feet south of small wooden culvert, in angle of rail fence; iron post stamped "819 IOWA".....	818.718
T. 76 N., R. 19 W., southeast corner of sec. 20, near Mount Vernon Chapel, in front yard of J. J. Woody, southeast of house and just inside fence along north side of road; iron post stamped "864 IOWA".....	863.777
<b>Mount Vernon Chapel south by road to corner of T. 74 and 75 N., R. 19 W. (1.25 miles north of Attica).</b>	
T. 76 N., R. 19 W., southeast corner of sec. 29, near Washington Church, in line with east and west road, in northeast root of maple tree 30 inches in diameter; 40-penny nail.....	877.718
T. 76 N., R. 19 W., 0.25 mile north of southeast corner of sec. 27, in pasture of P. Augustine, 290 feet north of T road, near fence west of road, in fork of box elder tree; 40-penny nail.....	798.028
T. 75 N., R. 19 W., northeast corner of sec. 3, 18 feet east of center of north and south road, in angle of fence; iron post stamped "849 IOWA".....	848.507
Rector, opposite sign board (Chicago, Rock Island & Pacific Ry.); top of rail.....	811.4
T. 75 N., R. 19 W., center of sec. 15, north and 55 feet east of center of crossroads, 2 feet south of fence; iron post stamped "854 IOWA".....	853.285
T. 75 N., R. 19 W., 0.5 mile north of southeast corner of sec. 27, south and 55 feet west of center of crossroads, 3 feet north of fence; iron post stamped "888 IOWA".....	887.459
T. 75 N., R. 19 W., southeast corner of sec. 27, at center of crossroads; section corner stone.....	910.96
<b>Sec. 27, T. 76 N., R. 19 W., north to Coalridge Church and return (Spur).</b>	
T. 76 N., R. 19 W., corner secs. 14, 15, 22 and 23, 3 miles west by 0.33 mile north of Howell station, in northwest corner sec. 23, in Coalridge Church yard, 25 feet east and 25 feet south of center of crossroads; iron post stamped "Prim. Trav. Sta. No. 3-1908 IOWA".....	823.831
<b>Dallas north by road 1 mile.</b>	
T. 75 N., R. 21 W., 0.25 mile north of southwest corner of sec. 23, at T road on east side of north and south road, 1 foot west of fence, 10 feet north of corner fence post; iron post stamped "912 IOWA".....	911.688
<b>Point near Percy east by road to Otley, thence via Fifield and Rosseau to Mount Vernon Chapel.</b>	
T. 77 N., R. 21 W., 0.25 mile west of northeast corner of sec. 13, at T road corner, 15 feet west and 60 feet south of center of crossroads, 1 foot east of fence; iron post stamped "825 IOWA".....	824.338
T. 77 N., R. 20 W., 0.5 mile east of southwest corner of sec. 9, 15 feet west and 50 feet north of center of crossroads, 3 feet east of fence; iron post stamped "824 IOWA".....	823.294

T. 77 N., R. 20 W., 0.5 mile east of southwest corner of sec. 12, 30 feet south and 85 feet west of center of crossroads, 4 feet north of fence; iron post stamped "837 IOWA".....	Feet. 836. 423
T. 77 N., R. 19 W., 0.5 mile south of northwest corner of sec. 9, at T road corner, east of north and south road, near residence of Arie Vriezelaar, in line with center of east and west road, 3 feet west of fence; iron post stamped "905 IOWA".....	904. 700
Otley, south side of main street, T. 77 N., R. 19 W., 0.38 mile west of northeast corner of sec. 22, at T road near west edge of village, 15 feet north of fence line, 425 feet west of railroad; iron post stamped "884 IOWA".....	883. 641
Otley, in front of station; top of rail.....	897. 0
T. 77 N., R. 19 W., 0.25 mile north of southwest corner of sec. 25, south of Pella-Otley road, 24 feet east and 20 feet south of center of crossroads, 2 feet north of fence; iron post stamped "883 IOWA".....	882. 652
T. 76 N., R. 19 W., southeast corner of sec. 2, west and 85 feet north of center of crossroads, 18 feet west of center of roadway, 30 feet east of bank of small creek; iron post stamped "749 IOWA".....	748. 844
Rosseau, 0.38 mile north and 0.06 mile west of southwest corner of sec. 9, T. 76 N., R. 19 W., east of north and south road, 85 feet south of residence of J. P. Amos; iron post stamped "763 IOWA".....	762. 053
T. 76 N., R. 19 W., 0.25 mile north of southwest corner of sec. 9, in west root of oak tree 24 inches in diameter; 40-penny nail.....	765. 87

## ATTICA QUADRANGLE.

Point 1.25 miles north of Attica west by road to point 1 mile north of Dallas.

Tps. 74 and 75 N., R. 19 W., 20 feet west by 10 feet north of corner of sections 2, 3, 34, and 35, 1.25 miles north of Attica, east of T road west; iron post stamped "Prim. Trav. Sta. No. 2-1908-908-IOWA".....	907. 387
T. 75 N., R. 19 W., sec. 32, southeast corner of, west and 50 feet south of center of crossroads, 2 feet east of fence; iron post stamped "824 IOWA".....	824. 044
Tps. 74 and 75 N., R. 20 W., 20 feet south and 25 feet west of corner of sections 1, 2, 35, and 36; iron post stamped "Prim. Trav. Sta. No. 1-1908-916-IOWA".....	915. 247
T. 75 N., R. 20 W., 0.25 mile east of southwest corner of sec. 33, 20 feet south and 15 feet west of junction of T road north and east and west road; 3 feet north of fence; iron post stamped "901 IOWA".....	901. 001
T. 75 N., R. 21 W., 0.25 mile west of southeast corner of sec. 35, 18 feet east and 10 feet south of center of crossroads, near corner fence post at southeast angle of T road, in stone; aluminum tablet stamped "Prim. Trav. Sta. No. 4-927-IOWA".....	926. 789

## Pella quadrangle.

## MAHASKA AND MARION COUNTIES.

The elevations in the following list are based on precise line from Council Bluffs to Des Moines in accordance with the 1907 adjustment.

The leveling was done in 1909 by G. E. Heebink.

## PELLA QUADRANGLE.

Otley eastward along highway 9 miles, thence south to Pella, thence southwest to Howell, thence northwest to sec. 2, T. 76 N., R. 19 W.	
Otley, south side of main street, 0.4 mile west of northeast corner of sec. 22, T. 77 N., R. 19 W., at T road near north edge of village, 15 feet north of fence line, 425 feet west of railroad; iron post stamped "884 IOWA".....	Feet. 883. 641

T. 77 N., R. 19 W., southwest corner of sec. 14, T corner; corner stone in center of road .....	Feet. 888.55
T. 76 N., R. 19 W., southeast corner of sec. 13, in north root of large cottonwood tree at end of road; 40-penny nail.....	903.02
T. 77 N., R. 18 W., 0.5 mile north of the southeast corner of sec. 18, south side of east and west road, in north root of 10-inch soft maple tree; 40-penny nail.....	874.02
T. 77 N., R. 18 W., 0.5 mile north of the southeast corner of sec. 17, on east side of north and south road, in southwest root of soft maple tree 30 inches in diameter, T corner; 40-penny nail.....	854.82
T. 77 N., R. 18 W., southeast corner of sec. 17, in southeast corner of Bethel Church yard, 35 feet southeast of front entrance of church; iron post stamped "860 IOWA".....	859.727
T. 77 N., R. 18 W., 0.3 mile east by 0.3 mile south of the northwest corner of sec. 22, T corner, in telephone post; three 40-penny nails.....	866.33
T. 77 N., R. 18 W., 0.3 mile south by 0.3 mile west of the northeast corner of sec. 23, west side of north and south road, 100 feet northwest of T corner, 24 feet northeast of large oak tree, 5 feet east of north and south fence; iron post.....	834.085
Pella, opposite station; top of rail.....	879.0
Pella, southeast corner of Central College campus; iron post stamped "878 IOWA".....	877.843
T. 76 N., R. 18 W., 0.5 mile north of the southeast corner of sec. 9, in telephone post; three 40-penny nails.....	854.92
T. 76 N., R. 18 W., 0.3 mile west of the southeast corner of sec. 9, T corner, on highest point of large rock near corner fence post; painted square....	816.10
Howell station, near, sec. 20, T. 76 N., R. 18 W., 525 feet north of Wabash R. R. crossing, 40 feet west of road near group of mail boxes on bank, 3 feet south of barb-wire fence, T corner; iron post.....	712.960
Howell station, 0.7 mile west of, railroad crossing; north rail.....	718.7
Howell station, 2 miles northeast of, railroad crossing; south rail.....	725.3
T. 76 N., R. 19 W., southeast corner of sec. 2, 85 feet north of center of road, 18 feet west of road, 30 feet east of bank of small creek; iron post stamped "749 IOWA" .....	748.844
<b>Point 9 miles east of Otley east 9 miles, thence south about 9 miles, thence west to Pella.</b>	
T. 77 N., R. 18 W., 0.25 mile south of the northeast corner of sec. 14, 170 feet east of T corner, in north root of large cottonwood tree; 40-penny nail .....	807.50
T. 77 N., R. 18 W., northeast corner of sec. 13, west side of north and south road, opposite stone house, in east root of maple tree 20 inches in diameter; 40-penny nail .....	758.88
T. 77 N., R. 17 W., 0.3 mile south of center of sec. 7, on projecting knob of fence post, T corner; painted square .....	752.64
T. 77 N., R. 17 W., 0.3 mile north of the southeast corner of sec. 8, on south side of east and west road, on bank, 18 feet east of corner fence post; iron post stamped "806 IOWA" .....	805.856
T. 77 N., R. 17 W., 0.3 mile north by 0.2 mile west of the southeast corner of sec. 9, in base of corner fence post; three 40-penny nails.....	844.72
T. 77 N., R. 17 W., 0.3 mile east of the southwest corner of sec. 10, on stone 15 feet northwest of intersection of roads; painted square.....	821.35
T. 77 N., R. 17 W., southeast corner of sec. 10, in corner fence post; three 40-penny nails.....	858.35

T. 77 N., R. 17 W., 0.5 mile north by 0.3 mile east of southwest corner of sec. 14, in root of hickory tree; 40-penny nail.....	Feet. 864. 22
T. 77 N., R. 17 W., 0.5 mile north of the southeast corner of sec. 14, on north side of east and west road, 60 feet northwest of intersection of roads, 3 feet south of east and west fence; iron post stamped "875 IOWA".....	874. 856
T. 77 N., R. 17 W., 0.3 mile south by 0.2 mile west of the northeast corner of sec. 23, in corner fence post; three 40-penny nails.....	855. 24
T. 77 N., R. 17 W., 0.5 mile west of the northeast corner of sec. 25, in fence post at corner, T corner; three 40-penny nails.....	858. 79
T. 77 N., R. 17 W., 0.5 mile east of the southwest corner of sec. 25, in corner fence post, T corner; three 40-penny nails.....	799. 68
T. 77 N., R. 17 W., 0.5 mile south by 0.3 mile east of the northwest corner of sec. 36, on east side of north and south road, 15 feet east of center of north and south road, 50 feet north of east and west road, 18 feet north of corner fence post, 3 feet west of north and south fence; iron post stamped "742 IOWA".....	741. 216
T. 77 N., R. 17 W., 0.3 mile west of the southeast corner of sec. 36, at intersection of roads, in south root of 30-inch elm tree; three 40-penny nails.....	845. 29
T. 76 N., R. 17 W., 0.2 mile west of the southeast corner of sec. 1, in projecting knob of base of 14-inch oak tree; 40-penny nail; T corner.....	797. 01
T. 76 N., R. 17 W., 0.3 mile west of the southeast corner of sec. 13, T corner, on west side of road, 40 feet north of center of road; iron post stamped "735 IOWA".....	734. 317
T. 76 N., R. 17 W., southwest corner of sec. 15, on east side of road, 17 feet southeast of road intersection, 10 feet south of corner fence post; crossroads.....	841. 341
T. 76 N., R. 17 W., 0.5 mile south of the northwest corner of sec. 18, on east side of highway, 70 feet north of Chicago, Rock Island & Pacific Railway track, 12 feet east of center of highway; iron post stamped "856 IOWA".....	855. 548
T. 76 N., R. 18 W., southeast corner of sec. 11, center of roadway, railway crossing, south rail.....	871. 7
Point 3.3 miles west of Tracy east to Foster, thence north to point 3.5 miles east of Fella.	
T. 75 N., R. 19 W., 0.5 mile north of the southeast corner of sec. 27, south and 55 feet west of center of crossroads, 3 feet north of fence; iron post stamped "888 IOWA".....	887. 459
T. 75 N., R. 18 W., 0.25 mile north of the southwest corner of sec. 30, on north side of road near southwest corner of Vigilance School grounds; iron post stamped "886 IOWA".....	885. 979
T. 75 N., R. 18 W., center of sec. 29, T corner, on highest point of rock at intersection; painted square.....	837. 60
T. 75 N., R. 18 W., 0.25 mile east of quarter corner on west side of sec. 27; iron post stamped "849 IOWA".....	848. 652
T. 75 N., R. 18 W., 0.5 mile north of southeast corner of sec. 26, T corner, at side of road; stone.....	758. 70
Tracy, 2 blocks east of Chicago, Burlington & Quincy R. R. station, west side of street, 3 feet east of fence, 60 feet north of Chicago, Burlington & Quincy R. R. track; iron post stamped "730 IOWA".....	729. 302
Tracy, 0.5 mile east of, railroad crossing; north rail.....	695. 94
Tracy, 3.5 miles east of, east of wagon road, railroad crossing; top of south rail.....	705. 62
T. 75 N., R. 17 W., 0.25 mile west of quarter corner on east side of sec. 27, on east side of road, 84 feet north of Chicago, Burlington & Quincy R. R. track, 3 feet west of fence; iron post stamped "700 IOWA".....	699. 736



	Feet.
Foster, opposite station; top of rail.....	702. 45
T. 75 N., R. 17 W., quarter corner on north side of sec. 25, T corner, on rock; painted square.....	730. 29
T. 75 N., R. 17 W., quarter corner on north side of sec. 24, on west side of road, 30 feet west of center of road, 30 feet north of center of road, southeast corner of Chas. Oswaldel's place, crossroads; iron post stamped "772 IOWA".....	772. 045
T. 75 N., R. 17 W., 0.25 mile north of quarter corner on south side of sec. 12, at railway crossing; top of rail.....	811. 53
T. 75 N., R. 17 W., near quarter corner on east side of sec. 11, railway crossing; top of rail.....	818. 51
Leighton, 0.5 mile east of, railway crossing; top of rail.....	759. 13
Leighton, quarter corner on south side of sec. 35, T. 76 N., R. 17 W., west side of road, 50 feet north of railroad; iron post stamped "761 IOWA".....	760. 497
T. 76 N., R. 17 W., center of sec. 26, crossroads, in corner fence post; three 40-penny nails.....	849. 67
T. 76 N., R. 17 W., quarter corner on east side of sec. 25, on stone at intersection of crossroads; painted square.....	843. 51
T. 76 N., R. 17 W., 0.25 mile north of southwest corner of sec. 19, T corner; iron post stamped "Prim. Trav. Sta. No. 8 IOWA 1908, 813".....	812. 246
T. 76 N., R. 17 W., 0.3 mile west of the southeast corner of sec. 13, on west side of road, 40 feet north of road, T corner; iron post stamped "735 IOWA".....	734. 317

#### Nebraska City quadrangle.

##### FREMONT COUNTY.

The elevations in the following list are based on a bench mark established by the Missouri River Commission 3,884 feet north of the railroad station at Nebraska City Junction, Iowa. The bench mark is a buried stone with a copper bolt, 3 feet under ground, surmounted by an iron post with a cap terminating in a rounded knob, marked "Missouri River Commission;" the accepted elevation of the top of cap is 924.589 feet.

The leveling was done in 1905 by F. W. Hughes.

#### NEBRASKA CITY QUADRANGLE.

##### Vicinity of Nebraska City Junction.

Nebraska City Junction, 3,884 feet north of station, 45 feet east of Chicago, Burlington & Quincy R. R. track, on sand knoll; top of cap of iron pipe marked "Missouri River Commission".....	Feet. 924. 589
Nebraska City Junction, 600 feet north of station, 40 feet west of Chicago, Burlington & Quincy R. R. tracks; iron post stamped "Prim. Trav. Sta. No. 1, 924 ADJ 1903".....	923. 350
Nebraska City Junction, 2 miles west of, 40 feet south of crossing, 30 feet east of center of road; iron post stamped "923 ADJ 1903".....	923. 191

#### Canton and Elk Point quadrangles.

##### LYON AND PLYMOUTH COUNTIES.

The elevations in the following list were determined by primary leveling extended from bench marks of the Missouri River Commission and the Coast and Geodetic Survey, and accord with the 1907

adjustment. A correction of plus 0.755 foot has been applied to the elevation, published in part 3 of the Report for 1894 of the Chief of Engineers, United States Army, for Elk Point and points west. Elk Point is a junction point with a precise-level line of the Coast and Geodetic Survey, which crosses the Canton and Elk Point quadrangles along the Chicago, Milwaukee & St. Paul Railway.

The leveling was done in the Canton quadrangle in 1896 by Alfred Tyler, and in the Elk Point quadrangle in 1898 by D. C. Wray.

#### CANTON QUADRANGLE.

Near Granite; portion of circuit, most of which is in South Dakota.

	Feet.
T. 99 N., R. 48 W., northwest corner of sec. 6; iron post stamped "YNKTN 1420".....	1,421.000
T. 100 N., R. 48 W., northwest corner of sec. 19; iron post stamped "YNKTN 1343".....	1,448.967

#### ELK POINT QUADRANGLE.

Sec. 3, T. 91 N., R. 49 W., east to line between Rs. 48 and 49 W., thence north to Akron.

T. 91 N., R. 48 W., sec. 6, northwest corner of; iron post stamped "YNKTN 1314".....	1,315.200
T. 92 N., R. 48 W., sec. 6, northwest corner of; iron post stamped "YNKTN 1140".....	1,140.824



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DEPARTMENT OF THE INTERIOR  
UNITED STATES GEOLOGICAL SURVEY

GEORGE OTIS SMITH, DIRECTOR

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**BULLETIN 461**

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RESULTS OF SPIRIT LEVELING  
IN  
MICHIGAN AND WISCONSIN

1897 TO 1909, INCLUSIVE

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R. B. MARSHALL, CHIEF GEOGRAPHER

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WORK IN MICHIGAN FROM 1901 TO 1909, INCLUSIVE, DONE  
IN COOPERATION WITH THE STATE



WASHINGTON  
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# RESULTS OF SPIRIT LEVELING IN MICHIGAN AND WISCONSIN, 1897 TO 1909, INCLUSIVE.

R. B. MARSHALL, Chief Geographer.

## INTRODUCTION.

*Scope of the work.*—All results of spirit leveling in the States of Michigan and Wisconsin previously published by the United States Geological Survey and all the results of later work are included in this report, rearranged by quadrangles. Unless otherwise stated all elevations are based on the precise level net adjustment of 1907 by the Coast and Geodetic Survey to a common mean sea-level datum. The part of this net which lies within or along the borders of these States comprises the line of the Mississippi River Commission along the western border of Wisconsin and the water leveling done by the Corps of Engineers, United States Army, on Lakes Superior, Huron, and Michigan.

*Personnel.*—The field work previous to 1903 was done under the general direction of J. H. Renshaw, geographer; that between 1903 and 1906, inclusive, under H. M. Wilson, geographer; and the later work under W. H. Herron, geographer, under the general direction of R. B. Marshall, chief geographer. The names of the various levelmen are given in the introduction to each list. The office work of computation, adjustment, and preparation of lists was done mainly by S. S. Gannett, geographer, and D. H. Baldwin, topographer, since 1907, under the general direction of E. M. Douglas, geographer.

*Method.*—The leveling in Michigan and Wisconsin was executed with Y levels and New York leveling rods modified to suit the special needs of the United States Geological Survey. Lines were run in circuits and sufficient accuracy maintained to insure closing errors not exceeding in feet  $0.05\sqrt{D}$ , in which formula D represents the length of the circuit in miles. The small outstanding errors by the office adjustment were distributed along the lines in proportion to their length.

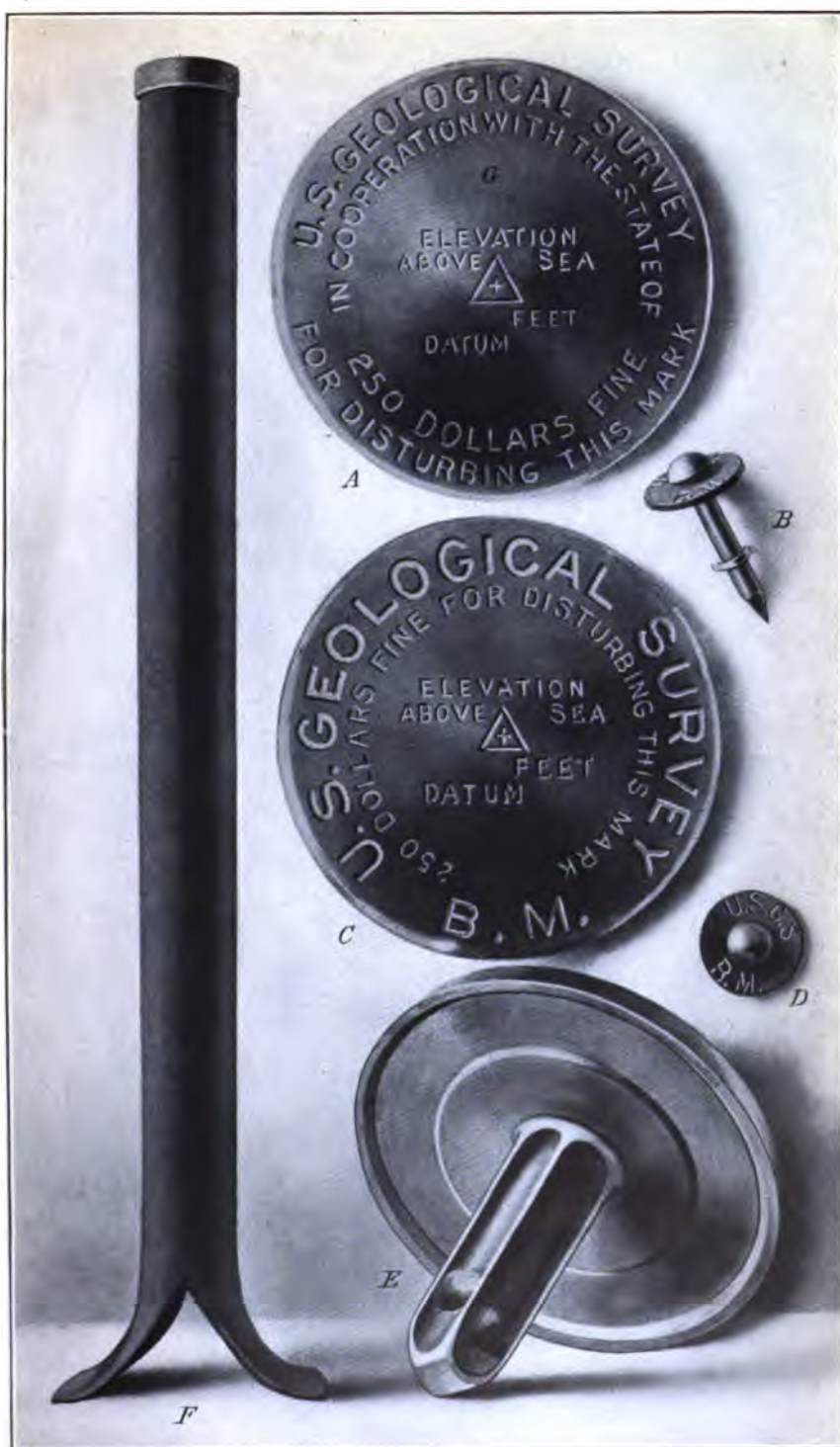
*Bench marks.*—The standard bench marks are of two forms. The first form is a circular bronze or aluminum tablet (C and E, Pl. I),  $3\frac{1}{2}$  inches in diameter and  $\frac{1}{4}$  inch thick, having a 3-inch stem, which is cemented in a drill hole in solid rock in the wall of some public building, bridge abutment, or other substantial masonry structure.

The second form (*F*, Pl. I), which is to be set in the ground where no masonry or rock is available, consists of a hollow wrought-iron post  $3\frac{1}{2}$  inches outside diameter and 4 feet long. The bottom is spread out to a width of 10 inches in order to give a firm bearing on the earth. A bronze or aluminum-bronze cap is riveted over the top of the post. A third style of bench mark with abbreviated lettering (*B* and *D*, Pl. I) is used for unimportant points. This consists of a special copper nail  $1\frac{1}{2}$  inches in length driven through a copper washer  $\frac{1}{2}$  inch in diameter. The tablets as well as the caps on the iron posts are appropriately lettered, and where States have cooperated in the leveling the fact of such cooperation is indicated by the addition of the State name (*G*, Pl. I).

The numbers stamped on the bench marks described in the following pages are the elevations to the nearest foot, as determined by the levelman. These numbers are stamped with  $\frac{1}{8}$ -inch steel dies on the tablets or post caps, to the left of the word "feet." The office adjustment of the notes and the reduction to mean sea-level datum may so change some of the figures that the original markings are 1 or 2 feet in error. It is assumed that engineers and others who have occasion to use the bench-mark elevations will apply to the Director of the United States Geological Survey, at Washington, D. C., for their adjusted values, using the markings as identification numbers only.

*Datum.*—All Geological Survey elevations are referred to mean sea level, which is the level that the sea would assume if the influence of tides and winds were eliminated. This level is not the elevation determined from the mean of the highest and lowest tides, nor is it the half sum of the mean of all the high tides and the mean of all the low tides, which is called the half-tide level. *Mean sea level is the average height of the water, all stages of the tide being considered.* It is determined from observations made by means of tidal gages placed at stations where local conditions, such as long, narrow bays, rivers, and like features will not affect the height of the water. To obtain even approximately correct results these observations must extend over at least one lunar month, and if great accuracy is desired they must extend over several years. At ocean stations the half-tide level and mean sea level usually differ but little. It is assumed that there is no difference between the mean sea level as determined from observations in the Atlantic Ocean, Gulf of Mexico, or the Pacific Ocean.

The connection with tidal stations for bench marks in certain areas that lie at some distance from the seacoast is still uncertain, and this fact is indicated by the addition of a letter or word to the right of the word "Datum" on tablets or posts. For such areas corrections for published results will be made from time to time as the precise level



GEOLOGICAL SURVEY BENCH MARKS.

*A*, Tablet used in cooperating States. The State name is inserted at *G*.  
*B* and *D*, Copper temporary bench mark, consisting of a nail and copper washer.  
*A*, *C*, and *E*, Tablets for stone or concrete structures.  
*F*, Iron post used where there is no rock.



lines of the Geological Survey or of other Government organizations are extended.

*Topographic maps.*—Maps of the following quadrangles wholly or partly in Michigan and Wisconsin have been published by the United States Geological Survey up to April 20, 1911. They may be obtained (except as noted) for 5 cents each, or \$3 a hundred, on application to the Director of the Survey, at Washington, D. C.

**Michigan.**

Ann Arbor. <sup>1</sup>	Passage Island.
Crystal Falls.	Perch Lake.
Detroit.	Pontiac.
Dexter. <sup>1</sup>	Rochester.
Fowlerville.	Romulus.
Grossepoint.	Sagola.
Howell.	Saline. <sup>2</sup>
Iron River (Mich.-Wis.).	South Lyon. <sup>1</sup>
Marquette.	Toledo (Ohio-Mich.).
Marquette special (50 cents).	Wayne.
Maumee Bay (Ohio-Mich.).	Witbeck.
Menominee special.	Wyandotte.
Milford.	Ypsilanti. <sup>1</sup>
Ned Lake.	

**Wisconsin.**

Baraboo.	Muskego. <sup>2</sup>
Bayview. <sup>2</sup>	Neenah.
Briggsville.	Oconomowoc.
Brodhead.	Portage.
Cross Plains.	Port Washington.
Delavan.	Poynette.
Denzer.	Racine. <sup>1</sup>
Eagle. <sup>2</sup>	Richland Center.
Elkader (Iowa-Wis.).	St. Croix Dalles (Wis.-Minn.).
Evansville.	Shopiere.
Fond du Lac.	Silver Lake. <sup>2</sup>
Geneva-Racine, double sheet (10 cents). <sup>2</sup>	Sparta.
Hartford.	Stoughton.
Iron River (Mich.-Wis.).	Sun Prairie.
Janesville.	The Dells.
Koshkonong.	Waterloo.
Lake Geneva. <sup>2</sup>	Watertown.
Lancaster (Wis.-Iowa-Ill.).	Waukesha.
Madison.	Waukegan (Ill.-Wis.).
Marathon special.	Waukon (Iowa-Wis.).
Milwaukee.	Wausau special.
Milwaukee special.	West Bend.
Mineral Point (Wis.-Ill.).	Whitewater.

<sup>1</sup> Dexter, Saline, South Lyon, and Ypsilanti maps show Ann Arbor quadrangle on larger scale.

<sup>2</sup> Bayview, Eagle, Lake Geneva, Muskego, Racine, and Silver Lake sheets, on scale of 1:62,500, have been reduced and form Geneva-Racine double sheet, on scale of 1:125,000.

## MICHIGAN.

## PRIMARY LEVELING.

## Ann Arbor, Detroit, Grosse Point, and Toledo Quadrangles.

## MONROE, WASHTENAW, AND WAYNE COUNTIES.

The elevations in the following list are based on that of permanent bench mark No. 1, of the United States Corps of Engineers, at Edward Hall's residence, Gibraltar. The elevation of this bench mark is accepted as 587.609 feet above mean sea level.

The leveling was done by R. E. Whipple in 1901-2 and by Fulton Pace in 1903. The two standard bench marks in the Grosse Point quadrangle were set in 1904 by C. E. Cooke, and the one in the Toledo quadrangle was set in 1899 by Dean Halford.

## ANN ARBOR QUADRANGLE.

New Boston along road northwest via Ypsilanti to Ann Arbor, thence south to Saline, thence east to New Boston.

	Feet.
Ypsilanti, corner of Summit and Cross streets; top of hydrant.....	713.90
Ypsilanti, in standpipe, north side; bronze tablet stamped "797 GIBRALTAR" .....	797.443
T. 3 S., R. 6 E., 0.4 mile southeast of corner of sec. 3, northeast side of road; iron post stamped "804 GIBRALTAR" .....	804.824
Ann Arbor, in south wall of university library; bronze tablet stamped "882 GIBRALTAR" .....	882.252
Ann Arbor, in southeast corner of courthouse; bronze tablet stamped "842 GIBRALTAR" .....	843.192
Ann Arbor, at northwest corner of Huron and Fourth Streets; city engineer's bench mark .....	838.80
Ann Arbor, T. 3 S., R. 5 E., 1,000 feet south of northeast corner of sec. 13, west side of road; iron post stamped "880 GIBRALTAR" ..	880.456
Saline, T. 4 S., R. 5 E., sec. 1, southeast cornerstone of Saline Bank; bronze tablet stamped "825 GIBRALTAR" .....	825.003
T. 4 S., R. 6 E., at quarter corner north side of sec. 2; iron post stamped "829 GIBRALTAR" .....	829.924
T. 4 S., R. 6 E., at northeast corner of sec. 1, at crossroads; iron post stamped "692 GIBRALTAR" .....	692.243
Ann Arbor north to Whitmore Lake, thence to schoolhouse in sec. 7, T. 1 S., R. 8 E., thence south 6 miles, thence west via Dixboro to Ann Arbor.	
T. 1 S., R. 6 E., 0.25 mile south of northeast corner of sec. 9, at crossroads; iron post stamped "926 GIBRALTAR" .....	926.181
T. 1 N., R. 6 E., at southeast corner of sec. 36, at crossroads; iron post stamped "918 GIBRALTAR" .....	918.681
T. 1 N., R. 7 E., at southeast corner of sec. 36, at crossroads; iron post stamped "975 GIBRALTAR" .....	975.813
T. 1 S., R. 7 E., at southeast corner of sec. 36, at crossroads; iron post stamped "850 GIBRALTAR" .....	850.657
Dixboro, in front of schoolhouse; iron post stamped "819 GIBRALTAR" .....	819.411

**Ann Arbor along road northwest via Dexter to Dover, thence east to Whitmore Lake.**

T. 2 S., R. 5 E., 0.25 mile south of northeast corner of sec. 22, 400 feet west of junction of roads, northeast abutment of bridge on masonry; chisel mark-----	Feet. 848.40
T. 2 S., R. 5 E., 0.12 mile north of north quarter corner of sec. 15, at crossroads; iron post stamped "912 GIBRALTAR"-----	911.963
T. 2 S., R. 4 E., junction of roads near east quarter corner of sec. 1; iron post stamped "870 GIBRALTAR"-----	870.382
T. 1 S., R. 4 E., near center of SW. $\frac{1}{4}$ sec. 13, at crossroads; iron post stamped "874 GIBRALTAR"-----	874.213
T. 1 N., R. 4 E., southeast corner of sec. 36; iron post stamped "885 GIBRALTAR"-----	885.782
T. 1 S., R. 5 E., 0.12 mile west of north quarter corner of sec. 11, at crossroads; iron post stamped "950 GIBRALTAR"-----	950.286
T. 1 N., R. 5 E., near center of SE. $\frac{1}{4}$ sec. 36, at junction of roads; iron post stamped "910 GIBRALTAR"-----	910.193

**Saline west to Bridgewater, thence south to northwest corner of sec. 1, T. 5 S., R. 4 E., thence east via Milan and Oakville to southeast corner of sec. 36, T. 4 S., R. 7 E., thence north to southeast corner of sec. 36, T. 3 S., R. 7 E.**

T. 3 S., R. 4 E., at southeast corner of sec. 36; iron post stamped "901 GIBRALTAR"-----	901.328
T. 4 S., R. 4 E., 0.25 mile west of northeast corner of sec. 14, at junction of roads; iron post stamped "882 GIBRALTAR"-----	882.790
T. 5 S., R. 4 E., northwest corner of sec. 1, at junction of roads; iron post stamped "879 GIBRALTAR"-----	879.578
T. 5 S., R. 5 E., quarter corner of sec. 3, north side of, at junction of roads; iron post stamped "775 GIBRALTAR"-----	775.499
T. 5 S., R. 6 E., west side of west quarter corner of sec. 33, at crossroads; iron post stamped "701 GIBRALTAR"-----	701.710
T. 5 S., R. 7 E., sec. 10, 0.8 mile south of Oakville, at crossroads; iron post stamped "671 GIBRALTAR"-----	671.585

**DETROIT QUADRANGLE.**

**Gibraltar along old plank road 5 miles southwest, thence west 3 miles, and thence north 5 miles to Flat Rock.**

T. 5 S., R. 10 E., in southeast corner of sec. 23, 4 miles southeast of Rockwood, in northeast corner of high bridge over Huron River; on top of bolt-----	581.80
T. 5 S., R. 10 E., in southeast corner of sec. 27, in northeast corner of highway bridge over small stream; top of bolt-----	578.97

**Flat Rock west along highway to northeast corner of sec. 1, T. 5 S., R. 8 E.**

T. 5 S., R. 9 E., in northwest corner of sec. 3, 3 miles west of Flat Rock, in front of Feldried's residence, 300 feet west of fork, on south side of road; iron post stamped "616 GIBRALTAR"-----	616.143
T. 5 S., R. 8 E., in northeast corner of sec. 1, 1.5 miles west of Waltz, in southwest corner of road forks; iron post stamped "626 GIBRALTAR"-----	625.672
T. 4 S., R. 8 E., in southeast corner of sec. 36, in northwest corner of road forks; iron post stamped "625 GIBRALTAR"-----	625.104
T. 4 S., R. 8 E., northeast corner of sec 5, at south side of road; iron post stamped "688 GIBRALTAR"-----	688.020



# 10 SPIRIT LEVELING IN MICHIGAN AND WISCONSIN, 1897 TO 1909.

Ecorse along highway 4 miles northwest, thence 2 miles west, thence 6 miles north via Inkster, thence 12 miles west to permanent bench mark in south-east corner of sec. 36, T. 1 S., R. 7 E.

Ecorse, United States Army Engineers' "P. B. M. 5," on east side of river road at foot of Labodie Street, in east face of foundation of W. D. Smith's residence, 10.5 inches from the southeast corner, in the seventh course of brick below the baseboard; brass bolt leaded horizontally -----	Feet. 584. 779
T. 3 S., R. 10 E., northeast corner of sec. 4, 1.5 miles northeast of Hand station, 80 feet west of south house, in southeast corner of crossroads; iron post stamped "616 GIBRALTAR"-----	615. 639
T. 3 S., R. 9 E., northeast corner of sec. 1, in southwest corner of crossroads; iron post stamped "626 GIBRALTAR"-----	625. 721
Inkster, 60 feet from crossing of Michigan Central R. R. and highway, east side of road, in front of post office; iron post stamped "636 GIBRALTAR"-----	636. 127
T. 2 S., R. 9 E., northeast corner of sec. 1, 60 feet from crossing, in southwest corner of crossroads; iron post stamped "639 GIBRALTAR"-----	639. 222
T. 2 S., R. 8 E., in southeast corner of sec. 2, on south side of road and 80 feet west of crossing of Pere Marquette R. R.; iron post stamped "697 GIBRALTAR"-----	697. 349
Plymouth, 1 mile south of, in northeast corner of abutment of highway bridge, 20 feet from crossroads, bridge over road running west; iron plate -----	714. 80

Southeast corner of sec. 36, T. 1 N., R. 7 E., along highway east via Northville and Clarenceville to Sand Hill, thence south and west to southwest corner of sec. 31, T. 1 S., R. 10 E.

Northville, north side of base-line road, on east side of prolongation of Center Street, in northeast corner of junction; iron post stamped "853 GIBRALTAR"-----	853. 345
T. 1 S., R. 8 E., northeast corner of sec. 1, south side of road, in front of Walnut ranch; iron post stamped "832 GIBRALTAR"-----	832. 312
T. 1 S., R. 9 E., quarter corner on north side of sec. 4, 2 miles southwest of Farmington, in southeast corner of crossroads at Northrop Corners; iron post stamped "701 GIBRALTAR"-----	701. 116
Clarenceville, 500 feet northwest of junction of base-line road and Grand River Road, 10 feet west of Grand River Road, 300 feet south of post office; iron post stamped "656 GIBRALTAR"-----	656. 106
T. 1 S., R. 10 E., in southeast corner of sec. 4, 1 mile north of Sand Hill, in northwest corner of crossroads; iron post stamped "633 GIBRALTAR"-----	632. 947

Fort Wayne along Artillery and Holder avenues to northeast corner of west half of sec. 4, T. 2 S., R. 10 E.

Fort Wayne, United States Army Engineers' bench mark No. 8, in southwest quarter of grounds, on river front of building No. 60, officers' quarters, in center of water-table course, 20 inches east from vertical center line of front of building, 3 feet 5 inches above ground; center of brass bolt marked "U. S. P. B. M."-----	601. 508
Detroit, intersection of Holden and Livernois Avenues; iron post stamped "610 GIBRALTAR"-----	610. 169

T. 2 S., R. 11 E., southwest corner of sec. 5, 2 miles southwest of Greenfield, at junction of Holden Avenue with road north and south; iron post stamped "610 GIBRALTAR"-----	Feet. 609.528
T. 2 S., R. 10 E., northeast corner of sec. 2, 2 miles southwest of Yew, church at crossroads, in seventh row of brick from foundation, second brick from northeast corner; nail-----	617.44
<b>Sand Hill north, thence east along public highway via Ferndale and Halfway to Milk River Point.</b>	
T. 1 N., R. 10 E., in northeast corner of sec. 34, in southwest corner of crossroads, in front of D. Boylan's residence; iron post stamped "668 GIBRALTAR"-----	668.581
T. 1 N., R. 11 E., in southwest corner of sec. 28, at crossroads, 2.5 miles southwest of Royal Oak; iron post stamped "664 GIBRALTAR"-----	664.351
Ferndale, 2 miles south of Royal Oak, at junction of road with Woodward Avenue; iron post stamped "650 GIBRALTAR"-----	649.801
T. 1 N., R. 12 E., southwest corner of sec. 30, at crossroads, 2.7 miles east of Ferndale; iron post stamped "632 GIBRALTAR"-----	632.335
T. 1 N., R. 12 E., northwest corner of sec. 34, intersection of road with Mount Olivet Street; iron post stamped "626 GIBRALTAR"-----	625.910
Milk River Point (Army Engineers' bench mark No. 38), on prolongation of south line of east-and-west road, on east side of north-and-south road, southeast corner of Lake St. Clair Harbor line, top of knob, southeast corner of stone monument, marked "Harbor Line Reference point C"-----	581.09
<b>Gibraltar west along road to Flat Rock, thence northwest to New Boston, thence east to Trenton, thence south to Gibraltar.</b>	
Gibraltar, Army Engineers' permanent bench mark 1, in rear of Edward Hall's residence on lake front, 75 feet southwest of house, in northeast corner of stone milkhouse, east face; brass bolt leaded horizontally-----	587.609
Gibraltar, 2.5 miles west of, T. 4 S., R. 10 E., near southwest corner of sec. 36, 40 feet east of crossroads, northwest abutment of bridge-Flat Rock, in front of Dr. Lobdell's office; iron post stamped "602 GIBRALTAR"-----	575.29 602.228
New Boston, 300 feet north of highway bridge over Huron River, on east side of road leading north, north side of river; iron post stamped "627 GIBRALTAR"-----	627.600
T. 4 S., R. 10 E., southwest corner of sec. 2, in northeast corner of crossroads; iron post stamped "599 GIBRALTAR"-----	598.906
Sibley station, T. 4 S., R. 11 E., northeast corner of sec. 7, at junction of River and Mud Roads; top of stone post stamped "U. S. H. L. 38 A"-----	588.24
<b>GROSSEPOINTE QUADRANGLE.<sup>1</sup></b>	
Halfway, southwest corner of crossroads, in corner of H. Hummerick's dooryard; iron post stamped "ADJ 615"-----	614.908
Milk River Point, 1.5 miles north of, at junction of Defers and Lake Shore wagon roads, north side of Defers Road, and west side of Lake Shore Road, on premises of Frank Streb; iron post stamped "ADJ 579"-----	578.755

<sup>1</sup> These bench marks were set in 1904 by C. E. Cooke from benches along the primary line run in 1903 by level party working under Robert Muldrow.

## 12 SPIRIT LEVELING IN MICHIGAN AND WISCONSIN, 1897 TO 1909.

### TOLEDO QUADRANGLE.<sup>1</sup>

Lambertville, 2 miles south of; 1 mile northeast of Trilby, Ohio, 0.5 mile north of State line, T. 8 S., R. 7 E., at southeast corner of sec. 32, on Jackman Road, 0.5 mile east of I. J. Jackman's house, in top course of south abutment of highway bridge over Halfway Creek; bronze tablet stamped "607 TOLEDO "-----	Feet. 607. 750
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### Pontiac and Rochester Quadrangles.

#### MACOMB AND OAKLAND COUNTIES.

The elevations in the following list are based upon the 1907 adjustment datum, through leveling on Detroit quadrangle from permanent bench mark No. 1 of the United States Corps of Engineers, at Edward Hall's residence, Gibraltar, the elevation of which is accepted as 587.609 feet above mean sea level.

Most of the leveling in the Pontiac quadrangle was done in 1905 by H. W. Peabody. The leveling in the Rochester quadrangle was done in 1906 by C. K. Alexander, who also did additional work in the Pontiac quadrangle.

The standard bench marks set in 1905 are stamped "ADJ 1905" in addition to figures of elevation. Those set in 1906 are stamped with figures of elevation to the nearest foot.

### PONTIAC QUADRANGLE.

#### Clarenceville to Franklin and return along public highways.

Franklin, T. 1 N., R. 10 E., northeast corner of sec. 6, 0.2 mile south of crossroads, in southwest corner of Geo. M. Bingham's brick store building on east side of road; aluminum tablet stamped "787 ADJ 1905 "-----	Feet. 787. 136
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#### Franklin along public roads to Pontiac.

T. 2 N., R. 10 E., southwest corner of sec. 9, 2.5 miles south of Pontiac, 0.25 mile south of crossroads, on northwest corner of painted brick house, east side of road (W. H. Williams farm); aluminum tablet stamped "937 ADJ 1905 "-----	937. 002
Pontiac, T. 3 N., R. 10 E., southeast corner of sec. 29, north face of northeast corner of Oakland County courthouse, southwest corner of Saginaw and Huron Streets; aluminum tablet stamped "944 ADJ 1905 "-----	943. 908

#### Pontiac to Commerce via Four Towns.

T. 2 N., R. 9 E., center of sec. 26, 3.5 miles west of Pontiac, in foundation at about center of east side of Waterford schoolhouse, sub-district No. 1, at southwest corner of crossroads; aluminum tablet stamped "944 ADJ 1905 "-----	944. 174
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<sup>1</sup> This bench mark was set from levels run in Ohio.

Four Towns, T. 3 N., R. 9 E., southeast corner of sec. 32, 7 miles west of Pontiac, 400 feet east of crossroads, in west face of northwest corner of schoolhouse; aluminum tablet stamped "955 ADJ 1905"-----	Feet. 954. 808
T. 2 N., R. 8 E., north of center of sec. 3, 1.25 miles north of Commerce, west of road, 0.25 mile south of Sugden schoolhouse; iron post stamped "Mich. Prim. Trav. Sta. No. 12, 948 ADJ 1905"-----	947. 761
Commerce, T. 2 N., R. 8 E., northeast part of sec. 10, on southwest corner of cross streets in center of village, on east face of northeast corner of Commerce Hall; aluminum tablet stamped "942 ADJ 1905"-----	941. 813

## Commerce to Franklin via Walled Lake.

Walled Lake, T. 2 N., R. 8 E., center of sec. 34, at northwest corner of T road to north by northeast, in east face of southeast corner of store building of C. F. Rose; aluminum tablet stamped "944 ADJ 1905"-----	943. 696
T. 1 N., R. 9 E., northeast corner of sec. 6, 3.75 miles east of Walled Lake, 2 miles west of North Farmington, 800 feet west of corners, southwest corner of crossroads, in north face at northeast corner of schoolhouse; aluminum tablet stamped "896 ADJ 1905"-----	895. 392
T. 2 N., R. 9 E., southeast corner of sec. 34, 1 mile east of North Farmington, in east face of northeast corner of foundation of house at northwest corner of crossroads by North Farmington electric railroad station; aluminum tablet stamped "891 ADJ 1905"-----	891. 144

## Commerce to Clarkston via Ox Bowl.

T. 3 N., R. 8 E., center of north side of sec. 27, 3.5 miles north of Commerce, at end of T road north, in north face of northwest corner of house of O. F. Stockwell; aluminum tablet stamped "998 ADJ 1905"-----	997. 768
T. 3 N., R. 8 E., northeast corner of sec. 3, 3.5 miles west by 2 miles south of Clarkston, 150 feet east of T road south, in north face of northeast corner of foundation of barn of A. R. Hubbard; aluminum tablet stamped "1025 ADJ 1905"-----	1, 024. 724
Clarkston, T. 4 N., R. 9 E., about center of sec. 20, near southeast corner of village, at southwest corner of Methodist Episcopal Church; aluminum tablet stamped "1015 ADJ 1905"-----	1, 014. 801

## Clarkston to Pontiac.

Sashabaw Plains Church, northwest corner of sec. 35, T. 4 N., R. 9 E., 1 mile south by 3 miles east of Clarkston, 800 feet west of crossroads, on south side of road, in east face of northeast corner of Presbyterian Church; aluminum tablet stamped "991 ADJ 1905"-----	990. 524
T. 3 N., R. 10 E., center of north side of sec. 8, 3.5 miles north of Pontiac, 0.25 mile east of end of road by schoolhouse and 0.25 mile west of Grand Trunk Railway track, in north face of northwest corner of 20 by 20 foot concrete building on south of road; aluminum tablet stamped "965 ADJ 1905"-----	964. 807

## Franklin east to Birmingham.

Birmingham, 3 miles west by 1 mile south of, 0.2 mile east of crossroads, in stone door sill or step, front, south face of stone house, residence of Mrs. Buell; aluminum tablet stamped "774"-----	773. 435
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# 14 SPIRIT LEVELING IN MICHIGAN AND WISCONSIN, 1897 TO 1909.

## ROCHESTER QUADRANGLE.

Point 4 miles north of Pontiac east to point near Orion, thence south via Amy to Birmingham.

Pontiac, 3.5 miles northeast of, in northwest corner of north foundation to Phillips schoolhouse; aluminum tablet stamped "948"-----	Feet. 948.460
Amy, in foundation stone in north front about 5 feet from northwest corner of Free Methodist Church; aluminum tablet stamped "873"-----	873.425
Amy, 1 mile southeast of, 0.1 mile south of crossroads, at east side of road, 10 feet from fence; iron post stamped "Prim. Trav. Sta. No. 1, 908"-----	903.184
Birmingham, 0.5 mile east by 2 miles north of, in top face, west side of south abutment of iron bridge over stream; aluminum tablet stamped "764"-----	764.036
Birmingham, Maple Avenue, 200 feet west of Saginaw Street, in stone water table, front face of brick building belonging to Whitehead & Mitchell; aluminum tablet stamped "784"-----	783.833

Birmingham east to Warren, thence north to Washington.

Closson station, on Detroit & Flint Electric Railway, in brick foundation, front face, 5 feet from southeast corner of house standing in northwest corner of crossroads; aluminum tablet stamped "688"-----	667.911
Birmingham, 5.5 miles east by 1 mile south of, in south abutment, east end of small bridge over county ditch at crossroads; aluminum tablet stamped "636"-----	636.210
Warren, in corner stone at northeast corner of Warren Savings Bank; aluminum tablet stamped "617"-----	617.089
Utica, 2 miles south of, 0.2 mile west of railway crossing, in north end of east abutment of bridge over Plum Brook; aluminum tablet stamped "620"-----	620.141
Utica, east side of, in stone water table of front face near northwest corner of Lutheran Church; aluminum tablet stamped "658"-----	657.862
Disco, 3 miles south of Washington and 5 miles east of Rochester, 100 feet southwest of crossroads, 5 feet from northeast corner of rock foundation of schoolhouse, in east face; aluminum tablet stamped "686"-----	686.490
Washington, 1.2 miles south of, in west side of south abutment of small bridge; aluminum tablet stamped "671"-----	671.239

Washington west via Rochester to point near Orion.

Rochester, southeast corner of Main and Fifth streets, in foundation corner stone at northwest corner brick building of J. W. Smith, in north face of stone; aluminum tablet stamped "756"-----	756.083
Rochester, 2.5 miles west by 3 miles north of, in large granite rock, in front of residence of O. Perry; aluminum tablet stamped "999"-----	998.518
Orion, 4 miles south by 0.5 mile east of, Howarth schoolhouse, in granite rock of foundation about center of north side of schoolhouse; aluminum tablet stamped "1069"-----	1,069.220

Utica west to Amy.

Utica, 2.5 miles northwest of, 1 mile west of Plains, 0.35 mile west of crossroads, in front brick face of schoolhouse, 7 feet from southwest corner; aluminum tablet stamped "710"-----	710.084
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Rochester, 2.8 miles south of, 0.4 mile north of stone shophouse of H. K. McCotter, in front face of foundation, 5 feet from southeast corner; aluminum tablet stamped "766"-----	Feet. 766.068
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**Howell and Milford Quadrangles.****LIVINGSTON AND OAKLAND COUNTIES.**

The initial point for elevations in the following list is taken from work on adjoining quadrangles based upon the precise level line of the Coast and Geodetic Survey along Detroit River.

The leveling was done in 1907 by F. H. West.

The work was done in cooperation with the State and the bench marks are stamped with the State name.

**HOWELL QUADRANGLE.**

Sec. 36, T. 1 N., R. 5 E., north along Ann Arbor Railroad to Ohlsen, thence along road west to sec. 20, T. 3 N., R. 4 E., north to Four Mile House, and east via Howell to Lemens Corners.

Ohlsen station, T. 2 N., R. 5 E., near center of southern boundary of sec. 28, 10 feet north of east and west road, 15 feet from west rail, 20 feet southwest of southwest corner of station; iron post stamped "936"-----	Feet. 936.359
T. 2 N., R. 4 E., northwest part of SE. $\frac{1}{4}$ sec. 25, 3.23 miles west of Ohlsen, north side of road just outside of garden fence, 40 feet west of Frank Rozk's house; iron post stamped "900"-----	989.925
T. 2 N., R. 4 E., southeast part of SE. $\frac{1}{4}$ sec. 22, in foundation of Marion Center schoolhouse, at junction of T roads, east side of north and south road; aluminum tablet stamped "964"-----	963.754
T. 2 N., R. 4 E., center of southern boundary of SE. $\frac{1}{4}$ sec. 8, 300 feet north of Smith's schoolhouse, at northeast corner of crossroads; iron post stamped "949"-----	949.057
T. 2 N., R. 4 E., southern central part of NE. $\frac{1}{4}$ sec. 5, 4 feet east of west end of schoolhouse, in stone foundation of schoolhouse at junction of Y roads, north side of schoolhouse; aluminum tablet stamped "928"-----	927.869
T. 3 N., R. 4 E., sec. 33, on east side of road, 0.15 mile north of crossroads at southwest corner of section, primary traverse station No. 18; iron post stamped "910"-----	910.501
T. 3 N., R. 4 E., west side of SW. $\frac{1}{4}$ sec. 21, at southeast corner of crossroads, diagonally opposite old Four Mile House owned by H. Klechler, in foundation of west side of house 18 inches from north front; aluminum tablet stamped "950"-----	949.649
T. 3 N., R. 4 E., southeast part of SW. $\frac{1}{4}$ sec. 27, 1.5 miles northwest Klechler, in foundation of west side of house 18 inches from north "884"-----	884.527
Howell, T. 2 N., R. 4 E., sec. 36, in south face of courthouse, east of south entrance, 2 stones below corner stone of courthouse; aluminum tablet stamped "942"-----	942.301
T. 3 N., R. 5 E., southeast corner of sec. 20, at northwest corner of junction of crossroads, 1.5 miles north by 3 miles east of Howell, just inside of fence corner; iron post stamped "961"-----	961.078

# 16 SPIRIT LEVELING IN MICHIGAN AND WISCONSIN, 1897 TO 1909.

T. 3 N., R. 5 E., 180 feet west along north border from northeast corner of NE. $\frac{1}{4}$ sec. 26, in west wing of south abutment of small stone and cement bridge over drain ditch 180 feet west of T roads; aluminum tablet stamped "972"-----	Feet. 971. 778
T. 3 N., R. 6 E., northeast corner of sec. 30, on south side of road at junction of T roads, 6 feet south of east and west roads; iron post stamped "1083"-----	1, 083. 021

## Lemens Corners along road south to Brighton, thence west to Chilsen.

T. 2 N., R. 6 E., center of NW. $\frac{1}{4}$ sec. 4, in east side of south abutment of bridge over drain between two lakes; aluminum tablet stamped "953"-----	953. 035
T. 2 N., R. 6 E., 0.25 mile east of center of sec. 20, northwest corner of T roads; iron post stamped "924"-----	924. 056
Brighton, T. 2 N., R. 6 E., sec. 31, north side of Main Street, 0.2 mile east of Pere Marquette Railroad crossing, in approach to fire-engine building, west of doors; aluminum tablet stamped "924"-----	924. 293

## Four-Mile House along road north to Sprague Corners, thence east via Deerfield to Tyrone Center.

T. 3 N., R. 4 E., quarter corner on east side of sec. 8, at southwest corner of crossroads, just outside of fence line, opposite Marr schoolhouse; iron post stamped "935"-----	934. 734
T. 4 N., R. 4 E., near center of east side of SE. $\frac{1}{4}$ sec. 29, on west side of road, in front of house of R. Autcliff, east of road, 0.15 mile south of T road, primary traverse station No. 17; iron post stamped "902"-----	902. 490
T. 4 N., R. 4 E., center of north side of NW. $\frac{1}{4}$ sec. 16, Sprague Corners, at southeast corner of crossroads opposite United Brethren Church, just outside fence line; iron post stamped "872"-----	871. 669
T. 4 N., R. 4 E., quarter corner on south side of sec. 14, about 75 feet north of church to west, 170 yards south of house of W. D. V. Cook, at northwest corner of T road to east, just outside of fence line; iron post stamped "879"-----	878. 994
T. 4 N., R. 5 E., southwest corner of sec. 20, at northeast corner of crossroads, 80 yards east and north of Jubbs schoolhouse, just outside of fence line; iron post stamped "897"-----	896. 843
T. 4 N., R. 5 E., northeast corner of sec. 29, primary traverse station No. 16, in small grass plot on south side of east and west road, west side of north and south road, 1 mile south by 1 mile west of Deerfield Center; iron post stamped "917"-----	917. 143
Deerfield Center, T. 4 N., R. 5 E., northeast corner of sec. 21, at southwest corner of T road south; iron post stamped "897"-----	897. 732
T. 4 N., R. 5 E., center of north side of NE. $\frac{1}{4}$ sec. 24, 2.75 miles east of Deerfield Center, at junction with T road north, just outside of fence line on south side of east and west road; iron post stamped "913"-----	912. 954
T. 4 N., R. 6 E., 300 feet east along north border from northwest corner of sec. 21, south side of road, 300 feet east of road crossing; primary traverse station No. 14; iron post stamped "1055"-----	1, 055. 351

**Lemens Corners north to Hartland.**

Hartland, sec. 13, T. 3 N., R. 6 E., 140 feet south of T road to east, east side of street, in north face, 9 inches from west front of store of G. W. Wallace (brick store); aluminum tablet stamped "949"-----	Feet. 948.924
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**MILFORD QUADRANGLE.****Tyrone Creek by road south to Hartland.**

T. 4 N., R. 6 E., 150 yards south along east border from northeast corner of SE. $\frac{1}{4}$ sec. 28, brick chimney in west face of First Methodist Episcopal Church, west side of road, 4.5 miles north of Hartland; aluminum tablet stamped "985"-----	984.816
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**At T. 3 N., R. 6 E., sec. 33.**

T. 3 N., R. 6 E., northeast part of SW. $\frac{1}{4}$ sec. 33, primary traverse station No. 13, on east side of road. 50 feet south from large barn; iron post stamped "967"-----	967.202
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**Walled Lake west along road to Brighton.**

Wixom, T. 2 N., R. 7 E., southwest corner of sec. 32, at junction of crossroads and railroad, 180 feet east of freight station, in small grass plot; iron post stamped "933"-----	932.827
New Hudson, T. 1 N., R. 7 E., near southeast corner of sec. 3, at railroad crossing, 20 feet west along dirt road from railroad on north side of road crossing, 150 yards east of Grand Trunk Railway station; iron post stamped "931"-----	931.068
T. 1 N., R. 7 E., 0.25 mile south of northeast corner of sec. 6, 2.6 miles west of New Hudson, in west abutment of steel and cement bridge over Huron River, north wing of abutment, 300 feet west of T road south, 1 foot north of east edge of bridge, 3 inches west of edge of abutment; aluminum tablet stamped "883"-----	882.912
Brighton, 3.4 miles east of, T. 1 N., R. 6 E., near northwest corner of NE. $\frac{1}{4}$ sec. 3, at southeast corner of crossroads; iron post stamped "898"-----	898.013

**Wixom north along Pere Marquette Railroad to Rose.**

Wixom, T. 2 N., R. 8 E., southwest corner of sec. 32, in small grass plot at junction of crossroads and railroad, 180 feet east of station; iron post stamped "933"-----	932.827
T. 2 N., R. 7 E., southwest part of SE. $\frac{1}{4}$ sec. 24, 2.25 miles northwest of Wixom, north side of road, 30 paces west of railroad crossing, near brick house; iron post stamped "941"-----	940.738
T. 2 N., R. 7 E., sec. 10, in small grass plot at north end of principal street directly east 100 yards from Milford Roller Mills, Yerkes & Son, proprietors; iron post stamped "946"-----	946.105
Highland, T. 3 N., R. 7 E., northwest corner of NE. $\frac{1}{4}$ sec. 27, 50 feet east of railroad, directly east of station, 15 feet south of road east and west; iron post stamped "1010"-----	1,010.386
Clyde, T. 3 N., R. 7 E., southeast part of SW. $\frac{1}{4}$ sec. 3, on south side of dirt road, 15 feet east of railroad, 270 feet north of station; iron post stamped "1029"-----	1,029.555



# 18 SPIRIT LEVELING IN MICHIGAN AND WISCONSIN, 1897 TO 1909.

Rose, T. 4 N., R. 7 E., near center of sec. 22, in grass plot at junction of T road with east and west road, 100 yards west along east and west road from railroad crossing; iron post stamped "980"----- Feet. 980.042

Glyde along highway to sec. 3, T. 3 N., R. 8 E.

White Lake, T. 3 N., R. 8 E., near northeast corner of SE.  $\frac{1}{4}$  sec. 16, southeast corner of T road, 60 feet north and east from Presbyterian Church, inside of fence corner; iron post stamped "1041"----- 1,041.266  
T. 3 N., R. 8 E., northeast corner of sec. 3, in north face of northeast corner of stone foundation of barn of A. B. Hubbard, Huron Valley Farm; aluminum tablet stamped "1025 ADJ 1905"----- 1,024.724

Rose along road west to Tyrone Creek.

T. 4 N., R. 7 E., near northeast corner of sec. 20, primary traverse station No. 15, 70 yards west of crossroads; iron post stamped "1011"----- 1,011.469  
T. 4 N., R. 7 E., southwest corner of sec. 17, 2.4 miles west of Rose, northeast corner of crossroads, inside of fence corner; iron post stamped "1023"----- 1,023.134  
Tyrone Creek, 1 mile east of, T. 4 N., R. 6 E., northeast corner of sec. 22, south side of road, just west of crossroads; iron post stamped "1050"----- 1,050.246

Chelsea, Fowlerville, and Mason Quadrangles.

INGHAM AND LIVINGSTON COUNTIES.

The elevations in the following list are from leveling done in 1908 by F. H. West.

## FOWLERVILLE QUADRANGLE.

Sprague Corners west 16 miles.

T. 4 N., R. 3 E., center of boundary line between secs. 13 and 14, directly in front of J. B. Fuller's house, in small grass plot at junction with T road; iron post stamped "907"----- Feet. 906.815  
T. 4 N., R. 3 E., northwest corner of sec. 14, 20 yards south of corners with T road south, at west side of north abutment of iron bridge over county ditch; on iron plate----- 882.53  
T. 4 N., R. 3 E., southeast corner of sec. 8, at northwest corner of crossroads, 3 feet south of fence line, 3 feet west of small ditch; iron post stamped "887"----- 887.376  
T. 4 N., R. 2 E., center of west boundary of NW.  $\frac{1}{4}$  sec. 13, at southeast corner of T road east, 0.25 mile north of William Arnold's house, in field just inside fence corner; iron post stamped "898"----- 897.600  
T. 4 N., R. 2 E., northwest corner of NE.  $\frac{1}{4}$  sec. 16, at southwest corner junction of crossroads, just outside fence line, near telegraph pole; iron post stamped "897"----- 897.195

**Point 2 miles southwest of Leroy east via Fowlerville to Four-Mile House.**

T. 3 N., R. 2 E., northeast corner of sec. 20, at southwest corner of crossroads, just outside fence line; iron post stamped "908"-----	Feet. 908.018
T. 3 N., R. 2 E., center of sec. 24, 0.5 mile north of schoolhouse east of road, in center of small grass plot at junction with T road south; iron post stamped "901"-----	900.615
T. 3 N., R. 3 E., southeast corner of sec. 21, 2 miles south by 1 mile west of Fowlerville, at north corner of T road north, just inside fence corner; iron post stamped "893"-----	892.382
Fowlerville, 0.05 mile east of station, at southeast corner of Pere Marquette Railroad and Brand Avenue crossing, 30 feet south of railroad, 5 feet east of road; iron post stamped "898"-----	897.605
T. 3 N., R. 4 E., center of southern boundary of NE. $\frac{1}{4}$ sec. 19, 3 miles southeast of Fowlerville, at northwest corner of Pere Marquette Railroad and dirt road crossing; iron post stamped "924"-----	923.961

**Point 2 miles southwest of Leroy south 8 miles, thence east via Plainfield post office to Smith schoolhouse.**

T. 3 N., R. 2 E., northeast corner of sec. 20, southwest corner of crossroads, near old panel fence corner, on highest point of large stone; painted circle-----	923.52
T. 2 N., R. 2 E., northwest corner of sec. 4, Vantown, at southeast corner of crossroads, in northwest corner of brick Memorial Church aluminum tablet stamped "935"-----	935.102
T. 2 N., R. 2 E., center of east boundary of NE. $\frac{1}{4}$ sec. 20, at southwest corner of crossroads, opposite house of E. M. Kimball, in field just inside barbed-wire fence; iron post stamped "950"-----	949.982
T. 2 N., R. 2 E., southwest part of NW. $\frac{1}{4}$ sec. 28, at northwest corner of crossroads, at foot of corner post in fence, on large stone; painted circle-----	961.83
T. 2 N., R. 2 E., near southeast corner of NE. $\frac{1}{4}$ sec. 35, at southeast corner of crossroads, just inside fence in field; iron post stamped "949"-----	948.387
T. 1 N., R. 3 E., center of west boundary of sec. 4, at northeast corner of T road east, on highest point of large boulder on edge of road; painted circle-----	947.09
T. 2 N., R. 3 E., near center of NE. $\frac{1}{4}$ sec. 34, at southeast corner of T road east, just outside of fence at foot of 14-inch oak tree; iron post stamped "948"-----	947.780
T. 2 N., R. 3 E., center of east boundary of sec. 24, at junction with T road west, 60 yards north of T road east, in grass plot; iron post stamped "948"-----	947.757
T. 2 N., R. 4 E., center of south boundary of NE. $\frac{1}{4}$ sec. 20, at northeast corner of road junction; top of large stone-----	952.90

**MASON QUADRANGLE.****Williamston north 4 miles, thence west 12 miles, thence south 9 miles, thence northeast to Williamston.**

Williamston, at southeast corner of Cedar Street and Grand River Road, across pavement from deserted warehouse, across street from Glaser's blacksmith shop, near telegraph pole between south edge of road and street, pavement marked "868"; iron post stamped "868"-----	868.300
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## 20 SPIRIT LEVELING IN MICHIGAN AND WISCONSIN, 1897 TO 1909.

T. 4 N., R. 1 E., near southwest corner of sec. 12, 4 miles north of Williamston, 5 feet from north edge of road, 60 yards east of T road south; iron post stamped "890"-----	Feet. 889.812
T. 4 N., R. 1 E., southwest corner of sec. 9, in grass plot at corner of T road north; iron post stamped "881"-----	880.530
Haslett, 0.25 miles west of, in grass plot at T road east; iron post stamped "862"-----	861.414
T. 4 N., R. 1 W., southwest part of sec. 8, at southwest corner of interurban railway and road crossing at Raby's crossing, just inside fence in field; iron post stamped "851"-----	851.363
T. 4 N., R. 2 W., center of section 13, 2.5 miles east of Lansing, north of road, 10 yards west of junction with T road south, diagonally opposite large deserted brick building at northwest corner of Michigan Agricultural College Experiment Station grounds, 72 feet southwest of southwest corner of house of Mr. Greary, 10 yards from north edge of road, in field; iron post stamped "837"-----	837.306
T. 4 N., R. 2 W., center of north boundary of SW. $\frac{1}{4}$ sec. 25, at southwest corner of T road south, on large white granite boulder; painted circle-----	874.48
T. 3 N., R. 2 W., northeast corner of sec. 2, at southwest corner of T road south, 15 feet from either road, inside lot; iron post stamped "869"-----	868.850
T. 3 N., R. 2 W., northwest corner of SW. $\frac{1}{4}$ sec. 12, at southeast corner of crossroads, at edge of road, on shelf formed in large boulder, highest point-----	872.72
Holt, 30 yards west of west end of station, 15 yards north of north track of Michigan Central Railroad, 7 yards south of south edge of east and west road; iron post stamped "882"-----	882.108
T. 3 N., R. 1 W., near northeast corner of sec. 31, at southwest corner of crossing of Michigan Central Railroad and dirt road running east and west, just inside fence corners of right-of-way fence and fence of private lot; iron post stamped "874"-----	874.324
T. 3 N., R. 1 W., center of south boundary of SW. $\frac{1}{4}$ sec. 29, at center of junction of crossroads, in root on east side of maple tree 16 inches in diameter; nail-----	891.03
T. 3 N., R. 1 W., northwest corner of NE. $\frac{1}{4}$ sec. 28, at southeast corner of crossroads, 25 yards from northwest corner of deserted cabin, just inside fence corner; iron post stamped "894"-----	894.229
T. 3 N., R. 1 W., southeast corner of sec. 14, at northwest corner of crossroads, in field just inside fence corners; iron post stamped "911"-----	910.857
T. 3 N., R. 1 E., southwest corner of sec. 4, 3 miles west by 1 mile south of Williamston, at northeast corner of crossroads, diagonally opposite schoolhouse, in field just inside fence; iron post stamped "895"-----	894.609
T. 2 N., R. 1 E., northeast corner of sec. 10, south of road at junction with T road north, on large stone; painted circle-----	875.53

Williamston south 3 miles, thence east 3 miles.

T. 3 N., R. 1 E., southwest corner of sec. 2, 1 mile south of Williamston, at northeast corner of crossroads, at edge of road junctions; top of large stone-----	888.07
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T. 3 N., R. 1 E., southeast corner of sec. 14, 3 miles south of Williamston, at northwest corner of crossroads, in field just inside of fence; iron post stamped "908"-----	Feet. 907. 370
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**Mason via Eden to Dansville, thence east 4 miles.**

Mason, 200 yards south and 100 yards east of station, across road, 50 yards north of Phoenix Roller Mills, in east end of east abutment of cement bridge over Cedar River; aluminum tablet stamped "S95"-----	894. 351
T. 2 N., R. 2 W., northeast corner of SE. $\frac{1}{4}$ sec. 13, at southwest corner of crossroads, diagonally opposite schoolhouse, in field just inside fence corner; iron post stamped "912"-----	912. 402
Eden station, Michigan Central Railroad, 300 feet north of, on opposite side of tracks, 45 feet east of railroad, 24 feet south of dirt road at crossing, diagonally opposite general store; iron post stamped "971"-----	970. 973
T. 1 N., R. 1 W., southeast corner of section 36, at northwest corner of crossroads opposite house of Morse Blakely, just outside of fence corner; iron post stamped "Prim. Trav. Sta. No. 16-975"-----	975. 088
T. 2 N., R. 1 E., sec. 34, east of road, 0.10 mile south of house of H. V. Wemple, 0.25 mile north of T road north, in field inside of fence corner; iron post stamped "981"-----	980. 406
Dansville, 0.25 mile east of principal street crossing, at northwest corner of Fairview Cemetery, just in corner of cement walk around cemetery; iron post stamped "951"-----	950. 437

**CHELSEA QUADRANGLE.**

**At Plainfield.**

Plainfield, in stone in southwest corner of foundation of Plainfield Presbyterian Church; aluminum tablet stamped "958"-----	958. 238
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**Lansing Quadrangle.**

**EATON AND INGHAM COUNTIES.**

The elevations in the following list were determined by primary level lines extending west from the Coast and Geodetic Survey precise line from Detroit to Cincinnati.

The leveling was done by L. D. Townsend in 1909.

**Lansing along highway to North Holt, thence west 13 miles via Dimondale.**

Lansing, Grand River, surface of water under Kalamazoo Street bridge, August 17, 1909-----	Feet. 818
Lansing, in southeast corner of abutment of South Washington Avenue concrete bridge over Grand River; aluminum tablet stamped "845 MICH"-----	844. 496
Holt, 3.5 miles northwest of, at T road west, at Town Line station of Pere Marquette Railroad, inside of fence at southwest corner of road crossing; iron post stamped "869 1909"-----	869. 284
North Holt, 1 mile south of, at east side of road, in line with right of way high tension wire poles, between road and fence, at head of T road west; iron post stamped "894 1909"-----	893. 439

## 22 SPIRIT LEVELING IN MICHIGAN AND WISCONSIN, 1897 TO 1909.

T. 3 N., R. 2 W., northeast corner of section 28, in southeast wing of abutment of crossway, just north of road crossing, at T road west, on stone; chiseled cross marked "880.3"-----	Feet. 879.99
T. 3 N., R. 2 W., northeast corner of section 30, in corner of field at southwest corner of crossroads, inside fence; iron post stamped "868 1909"-----	867
T. 3 N., R. 2 W., northwest corner of section 30 (county line), at northeast corner of crossroads, edge of track as road turns north, in square on highest point of large stone; chiseled cross marked "868.9"-----	868.65
T. 3 N., R. 3 W., southeast corner of section 23, in road curving west to T road west, 15 feet west of road crossing, on stone marking section corner; chiseled cross marked "885.6"-----	885.29
T. 3 N., R. 3 W., northwest corner of section 26, at southeast corner of crossroad, on roadside; iron post stamped "Prim. Trav. Sta. No. 4 913"-----	913.014
Dimondale, at crossroads to southwest of bridge over Grand River, at north corner, in corner of walks, in square on top of bowlder; chiseled cross marked "859.6"-----	859.31
Grand River, under bridge at Dimondale, surface of water August 26, 1909-----	841.00
Dimondale, at four corners northeast of Grand River bridge, in southwest wall of brick block on north corner, 4.2 feet up from walk and 1.3 feet from front side of building, 12 feet south of town pump; aluminum tablet stamped "866 1909"-----	865.829
West Windsor, near southwest corner of NW. $\frac{1}{4}$ sec. 17, T. 3 N., R. 3 W., at crossroads, 8 feet from fence on southeast side of road called "the State road," under walnut tree; iron post stamped "944 1909"-----	943.281
<b>Sec. 13, T. 3 N., R. 4 W., north 6 miles, thence east to Lansing along highway.</b>	
T. 3 N., R. 4 W., northwest corner of sec. 13, southeast corner of crossroads, outside fence; iron post stamped "881 1909"-----	880.708
T. 3 N., R. 4 W., southeast corner of NE. $\frac{1}{4}$ sec. 2, at northwest corner of T road west, in square on highest point of largest stone in pile of stones; chiseled cross marked "858.9"-----	858.65
T. 4 N., R. 4 W., northeast corner of sec. 35, at northwest corner of "Canada Settlement" school yard, on south side of east-west road which Ts with north-south road, 150 feet east of school yard; iron post stamped "885 1909"-----	884.282
T. 4 N., R. 4 W., southeast corner of sec. 14, on northeast corner of bottom step of concrete steps of schoolhouse, district No. 6, at northwest corner of crossroads, in square; chiseled cross marked "879.1"-----	878.85
Grand Ledge, 1 mile south of, northwest corner of sec. 13, T. 4 N., R. 4 W., southeast corner of crossroads, in fence corner inside field; iron post stamped "860 1909"-----	859.853
T. 4 N., R. 3 W., southeast corner of sec. 9, at northwest corner of crossroads, in back wall of brick schoolhouse, district No. 6 Delta, about 3 feet from ground and in center of wall; aluminum tablet stamped "864 1909"-----	863.868

T. 4 N., R. 3 W., southeast corner of sec. 12, on county line between Ingham and Eaton counties, at northwest corner of cross roads, inside of fence; iron post stamped "862 1909"-----	Feet. 861.820
Grand River, surface of water in under Saginaw Street bridge September 3, 1909; marked "815"-----	815
<b>Point 2 miles south of North Holt south to Aurelius Center, thence west to Eaton Rapids, thence west and north to Pottersville along highway.</b>	
T. 3 N., R. 2 W., southeast corner of sec. 34, at northwest corner of T road west (town-line road), 2 feet from and along north-south road, outside fence; iron post stamped "932 1909"-----	931.351
T. 2 N., R. 2 W., center of west border of sec. 14, at head of T road from west, in right of way, 5 feet east of fence; iron post stamped "924 1909"-----	924.117
Aurelius Center, 600 feet west of crossroads, 4 feet from fence, in right of way, north of east-west road; iron post stamped "963 1909"-----	962.757
T. 2 N., R. 2 W., southwest corner of sec. 28, at northeast corner of crossroads, 45 feet from crossing, near fence, diagonally opposite schoolhouse, in square on stone; chiseled cross marked "947.6"-----	947.31
Aurelius Center, 4 miles west of, on northeast corner of crossroads, on Ingham-Eaton county line, inside and 3 feet from either fence; iron post stamped "943 1909"-----	942.260
Eaton Rapids, Knight Street East, on southeast abutment of bridge across Grand River, 2 feet from sidewalk, on level with same; aluminum tablet stamped "874 1909"-----	873.515
Grand River, surface of water under Knight Street East bridge at Eaton Rapids; September 10, 1909-----	862
T. 2 N., R. 3 W., 0.25 mile north of southeast corner of sec. 30, at southwest corner of crossroads, 2 feet outside of north fence to school yard; iron post stamped "920 1909"-----	919.382
T. 2 N., R. 4 W., southeast corner of sec. 12, west side of road, 10 feet from fence, at northeast corner of school yard, 160 feet north of road crossing, on range line between Eaton and Eaton Rapids townships; iron post stamped "896 1909"-----	896.169
Pottersville, 2 miles south of, at crossroads at northwest corner of "Fast" school yard, in line with road fence, at southwest corner of road, 150 feet from road crossing; iron post stamped "921 1909"---	920.473
Pottersville, 0.5 mile south of, at head of T road east, on west side of road, in root on south side of maple tree; copper nail with washer marked "890.4"-----	890.22

**Bench mark set by F. H. West in 1908; corrected by Townsend, 1909.**

T. 2 N., R. 2 W., southeast corner of section 20, at northwest corner of crossroads, in schoolhouse yard, 100 yards east of southeast corner of schoolhouse; Prim. Trav. Sta. No. 15; iron post stamped "981"-----	980.529
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## 24 SPIRIT LEVELING IN MICHIGAN AND WISCONSIN, 1897 TO 1909.

### Marquette Quadrangle.

#### MARQUETTE COUNTY.

The elevations in the following list are based upon the United States Corps of Engineers bench mark No. 11, at Marquette, the accepted elevation of which is 620.678 feet above mean sea level.

The leveling was done in 1905 by J. N. Williamson.

#### MARQUETTE QUADRANGLE.

##### Marquette west along Duluth, South Shore & Atlantic Railway (northern line) to Morgan Furnace.

	Feet.
Marquette, new pump house, city waterworks, on water table 10 inches from southwest corner, United States Corps of Engineers bench mark, No. 11-----	620. 678
Marquette, at foot of Ridge Street, 4 feet 8 inches north of base of Pere Marquette monument, in outcrop of gray trap rock, aluminum tablet stamped "625 ADJ"-----	624. 870
Marquette, northwest corner Third and Washington streets, on east side of Government building, in south end of doorsill; aluminum tablet stamped "674 ADJ"-----	673. 702
Valley Mills, 90 feet west of road crossing, in east end of outcrop of rock; aluminum tablet stamped "991 ADJ"-----	991. 134
Whitman, 0.25 mile south of; 315 feet south of trestle over Duluth, South Shore & Atlantic Railway, east-bound track, on east side of Lake Superior & Ishpeming Railway, at south end of rock cut and opposite milepost 9, in outcrop of rock; aluminum tablet stamped "1200 ADJ"-----	1, 260. 520

##### Morgan Furnace east along Duluth, South Shore & Atlantic Railway (southern line) to Marquette.

Freeman's crossing, 200 feet west of; 37 feet south of west-bound track, in large flat rock; aluminum tablet stamped "1218 ADJ"-----	1, 217. 661
Marquette, 2.5 miles southwest of; 42 feet south of west-bound track in large pink marble on sidehill above Carp River; aluminum tablet stamped "863 ADJ"-----	862. 871

##### Marquette via Lake Superior & Ishpeming Railway to Presque Isle.

Presque Isle, 2 miles west of; 45 feet north of center of track, 25 feet east of milepost 2, in granite outcrop; aluminum tablet stamped "679 ADJ"-----	679. 207
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#### Calumet Special Quadrangle.

#### HOUGHTON AND KEWEENAW COUNTIES.

The elevations in the following list were determined by primary leveling extended from the United States Army Engineers' bench marks of the Lake Survey at Houghton and Hancock, Mich. The Lake Superior low-water datum plane is accepted as 601.750 feet above mean sea level, as determined at Duluth, Minn.

The leveling was done in 1902 by F. H. West.

The work was done in cooperation with the State, and the standard bench marks are stamped with the State name.

**Hancock north along Copper Range Railroad to Boston, thence northeast along highways to Calumet Junction.**

Hancock, southwest corner brick office building at Detroit & Lake Superior Smelting Works, on beveled edge of sandstone water table about midway of bevel; small horizontal surface cut (United States Army Engineers' bench mark No. 2, established 1893)-----	Feet. 609. 829
Hancock, Lake View station, 0.85 mile west of, at northeast corner Duluth, South Shore & Atlantic Railway and dirt road crossing, one block south of Houghton County Electric Co. car barn, on top of large stone; chiseled circle-----	817. 46
Swedetown, 300 feet east of road crossing, west of Duluth, South Shore & Atlantic Railway main line and siding into buildings, 3 feet above ground and 6 feet from northwest corner of brick magazine of Du Pont Powder Co.; aluminum tablet stamped "965"-----	965. 062
Swedetown, 0.65 mile northeast of, 30 feet south of Franklin dirt road crossing, west side of east rail, on joining panel between two rails; chiseled square-----	1, 007. 72
Franklin Junction, in east end of cement base of elevated road trestle over which Houghton County Electric Co. line crosses, south of railroad, 1.5 feet from east end in center of base; aluminum tablet stamped "1069"-----	1, 068. 739
Boston, 100 yards directly east of station, at road crossing, 8 feet from north end of 18-inch drain pipe crossing road east of north-and-south road; chiseled square-----	1, 097. 45
Highway, 0.55 mile east of, at Y roads, on oblique face of stone, 5 feet from either road, halfway up oblique edge; chiseled square-----	1, 159. 75
Highway, at north side of road midway between T road north and Duluth South Shore & Atlantic Railway, on highest point of large boulder; chiseled cross-----	1, 156. 75
Highway, 0.97 mile east of, at northeast corner of crossroads, just inside barbed-wire fence line; iron post stamped "1162"-----	1, 162. 130
Osceola, 25 yards east of, at southwest corner crossroads, center of top of large boulder; chiseled square-----	1, 176. 07
Osceola, in northwest corner of lot 165 feet north of electric railroad crossing, 263 feet southwest of Duluth, South Shore & Atlantic Railway cattle guard, in concrete post; aluminum tablet stamped "Prim. Trav. Sta. No. 2-1173"-----	1, 172. 788
Duluth, South Shore & Atlantic Railway crossing; north rail-----	1, 176. 2
Between Hecla and Ramey, at southeast corner of road and railroad crossing, diagonally opposite large church, in old brownstone engine house of Calumet & Hecla Mining Co., on sill of lowest north window in east front of building at south edge of window; chiseled square-----	1, 236. 58
Calumet, near center of west edge of lot with office buildings of Calumet & Hecla Mining Co., about 3 feet from wagon shed to north, 60 feet north of northwest corner of president's lodge, 35 feet northwest of flagstaff, just inside picket fence; iron post stamped "1241"-----	1, 240. 671
Calumet, southeast corner of junction of Calumet and Pine streets, on $\frac{1}{4}$ -inch nut in west face of fire plug, 1 foot from bottom; chiseled cross-----	1, 228. 85



# 26 SPIRIT LEVELING IN MICHIGAN AND WISCONSIN, 1897 TO 1909.

Calumet Junction east along Copper Range Railroad to St. Louis Hill, thence east and southwest along highway and Copper Range Railroad near west shore of Torch Lake to Hancock.

Calumet, 3.1 miles northeast of, at southeast corner of road and railroad crossing, in joining panel on east side of east rail at south edge of road crossing; chiseled square.....	Feet. 1,099.50
Calumet, 1.5 miles east of, at northeast corner of crossing of Copper Range Railroad and dirt road, on top of St. Louis Hill, in field about 30 feet from either side of angle formed by railroad and dirt road; iron post stamped "1008".....	1,008.386
Calumet, 2.5 miles east of, at northeast corner T road north, 25 yards west of Trap Rock schoolhouse; iron post stamped "639".....	639.553
Lake Linden, northeast end of town, east end of bridge over Trap Rock River, south of road, on base stone for end of bridge; chiseled cross.....	609.16
Lake Linden, surface of Trap Rock River under bridge, July 20, 1908.....	604
Lake Linden, surface of Torch Lake, July 20, 1908.....	603.3
Lake Linden, docks at foot of Lake Street, south of St. Joseph's Church, in telegraph pole south of street and east of railroad, 10 feet northwest of northwest corner of standard scales; top of 60-penny spike.....	607.82
Lake Linden, south end of town, about 100 yards north of terminal of Duluth, South Shore & Atlantic Railway, east of Lake Linden-Hancock pike, just north of Copper Range Railroad crossing, in cement post in southwest corner of Calumet & Hecla Smelter Co.'s grounds; aluminum tablet stamped "623".....	622.989
Lake Linden, south end of town, at southeast corner of T Street east, one block north and one block west of Calumet & Hecla smelter, opposite Methodist Episcopal Church, 50 yards south of Congregational Church, on north side of telegraph pole on spike projecting 1½ inches, used as step in climbing pole; chiseled cross.....	634.30
Hubbell, 750 feet north of station, 300 feet north of sign "Mills 1 mile," 300 feet north of Duncan Avenue, opposite Schwermann's brewery, 75 yards northwest of northwest corner of Opal's store, at southeast corner railroad and street crossing, 2.5 feet east of east rail of Duluth, South Shore & Atlantic Railway, 1 foot south of board walk, top of 1-inch square bolt; chiseled cross.....	628.83
Mills station, in front of; top of east rail.....	634.09
Quincy Stamp Mills, 3,400 feet northeast of, west of Hancock pike, in concrete post; aluminum tablet stamped "Prim. Trav. Sta. No. 15-630".....	630.522
May, 0.25 mile south of, 100 yards west of Duluth, South Shore & Atlantic Railway, 2 inches from either side of angle formed by south and east sides of top of concrete base for north pillar of railroad overhead bridge, west of road; chiseled square.....	630.31
Dollar Bay station, on Copper Range Railroad, in plot back of station, at northeast corner of T road about 75 yards west of station, opposite saloon; iron post stamped "634".....	634.212
Ripley, at road crossing directly in front of northwest corner of Standard Oil Co.'s building, west of road north of Duluth, South Shore & Atlantic Railway, on southeast corner of base plate of switch signal; chiseled cross.....	607.22

**Calumet Junction northeast along highway to Cliff (run twice).**

Centennial, in southwest corner of stone foundation of Centennial Methodist Episcopal Church; aluminum tablet stamped "1189"-----	Feet. 1, 189. 748
Kearsarge, at T road east to Kearsarge mine, west side of Calumet-Cliff pike, nearly highest point; chiseled circle-----	1, 130. 48
Allouez, 470 yards south of T road at north end of town, west of road, 100 yards south of blacksmith shop, in cement post; aluminum tablet stamped "1027"-----	1, 027. 089
Mohawk, 1 mile west of, at southeast corner of junction of Mohawk Road with Calumet-Cliff pike, on top of stone; chiseled circle-----	898. 09
Sarica Lake, at Y road running west through fields, at angle in road as it runs around Sarica Lake, on southwest corner of stone; chiseled mark (old survey mark)-----	939. 09
Frank Charrier's road house, 900 feet southwest of road, 100 yards north of wood road to west, at summit, in cement post set flush with ground; aluminum tablet stamped "1028"-----	1, 028. 161
Winfred Gagrón's Halfway House, directly opposite, west of road, in shelf of large bowlder; chiseled square U. S. B. M.-----	1, 132. 62
Cliff, at southeast corner of T road east, 100 yards southwest of Cliff mine shaft, just outside fence line of lot around large frame house on hill to east, in cement post; aluminum tablet stamped "987"---	986. 701

**Allouez northwest to old Calumet & Hecla stamp mill (run twice).**

Banneelltown, 20 yards south of red house, last house west in town, 54 yards south of Y road southwest to lake shore, west of road, on shelf in east face of bowlder; chiseled square-----	1, 132. 02
Old Calumet & Hecla stamp mill, 1.25 miles north and west of, on road to Gratiot River and Lake Shore, 30 feet west of Allouez road, at forks of roads at south edge of distinct clearing; iron post-----	811. 531

**Boston northwest to Hancock Township (run twice).**

Boston, 0.55 mile west of, at Y roads, on large stone south of road, 20 paces west of house; chiseled cross-----	1, 091. 27
Boston, 1.25 miles west of, at southeast corner of T road south to Franklin, on large stone; chiseled cross-----	1, 045. 82
Boston, 1.75 miles west of, in southeast corner of Hancock Township, 10 feet north of road near wire fence; iron post stamped "1025"---	1, 025. 480

**At Houghton.**

Houghton, on west line of Huron Street, about 275 feet north of Sheldon Street, 5 feet from corner, 1.5 feet above sidewalk, in stone foundation wall of brick store building of L. Hennes & Co.; top of 60-penny cut spike (U. S. Lake Survey bench mark, established 1883)-----	608. 747
Houghton, in stone foundation wall of brick store building of L. Hennes & Co., north face of wall, about 3 feet from northeast corner, 5 feet above ground; aluminum tablet stamped "612"-----	611. 568
Houghton, Michigan School of Mines, in lawn directly in front of main building, 18 feet east of walk leading directly east from main building, 54 feet from walk running in front of building; iron post stamped "695"-----	694. 523

**Menominee Special Quadrangle.****DICKINSON COUNTY.**

The elevations in the following list are approximate. They are based on the top of rail of the Chicago, Milwaukee & St. Paul Railway track in front of the station at Iron Mountain, the elevation of which is accepted as 1,135 feet above sea level. The elevations are not on the 1907 adjustment datum.

The leveling was done in 1898 by Jesse L. Holman.

**Iron Mountain.**

T. 40 N., R. 30 W., NW. $\frac{1}{4}$ sec. 31, in northwest corner of courthouse, 10 feet north of west entrance; aluminum bolt, marked "IM 1155" -----	Feet. 1, 155. 33
T. 40 N., R. 31 W., SW. $\frac{1}{4}$ sec. 1, in large trap rock 300 feet north of east end of bridge over Menominee River; aluminum tablet, marked "IM 1108" -----	1, 108. 07
Quinnesec, T. 39 N., R. 30 W., NE. $\frac{1}{4}$ sec. 3, in southwest corner of large brick building owned by Capt. John Buell; aluminum tablet, marked "IM 1040" -----	1, 039. 77
Norway, T. 39 N., R. 29 W., NE. $\frac{1}{4}$ sec. 8, northeast corner of foundation of schoolhouse; aluminum tablet marked "IM 946" -----	945. 61
Waucedah, T. 39 N., R. 28 W., NE. $\frac{1}{4}$ sec. 22, northwest corner of foundation of schoolhouse; aluminum tablet marked "IM 904" ---	904. 44

**WISCONSIN.****PRIMARY LEVELING.**

Evansville, Koshkonong, Madison, Milwaukee, Oconomowoc, Sun Prairie, Waterloo, Watertown, Waukesha, and Whitewater Quadrangles.

DANE, DODGE, GREEN, JEFFERSON, MILWAUKEE, ROCK, WALWORTH, WASHINGTON, AND WAUKESHA COUNTIES.

The elevations in the following list were determined by primary leveling extended from bench mark No. 2 of the United States Lake Survey at Milwaukee, and adjusted with those in Poynette quadrangle to agree with the elevation at Portage derived by leveling of the Army engineers, also from Milwaukee.

The leveling was done in the Milwaukee, Watertown, Waukesha, Whitewater, and Koshkonong quadrangles in 1903 by G. M. Dimmick; in the Oconomowoc quadrangle in 1903 by Dimmick, and in 1906 by L. P. Gerrard; in the Waterloo quadrangle in 1903 by Dimmick, in 1904 by M. A. Steele, in 1905 by H. Bücher, and in 1908 by E. M. Bandli; in the Sun Prairie quadrangle in 1904 by Steele and in 1905 by Bücher; and in the Evansville and Madison quadrangles in 1904 by Steele. Two bench marks were established in the Watertown quadrangle in 1908 by E. M. Bandli.

**MILWAUKEE QUADRANGLE.**

**Milwaukee west along Chicago & Northwestern Railway to Layton Park**  
(double-rodged line).

Milwaukee, in seventh ward, near southeast corner of courthouse square; top of stone monument (United States Lake Survey bench mark No. 2)-----	Feet. 636.056
Milwaukee, 4.3 miles south of courthouse, south end of east abutment of railroad bridge; chiseled square-----	623.11
Layton Park, 5.9 miles west of Milwaukee, in foundation wall of school building No. 17, center of front face; bronze tablet stamped "669 MILWAUKEE 1903"-----	669.070

**WAUKESHA QUADRANGLE.**

**Layton Park west along Chicago & Northwestern Railway to Waukesha**  
(double-rodged line).

North Greenfield, 3.5 miles west of Layton Park, in foundation wall of store of R. Polzin, center of east face; bronze tablet stamped "738 MILWAUKEE 1903"-----	738.223
County line, 3.1 miles west of North Greenfield, in center of east abutment of highway bridge 50 feet south of railway track; bronze tablet stamped "776 MILWAUKEE 1903"-----	776.494
Calhoun, 0.5 mile west of, top of south abutment of railroad bridge 1057; aluminum tablet stamped "844 MILWAUKEE"-----	844.371
Waukesha, 300 feet east of Chicago & Northwestern Railway station, north face of office of Milwaukee-Waukesha Mining Co., in water table; aluminum tablet stamped "822 MILWAUKEE 1903"-----	821.889

**OCONOMOWOC QUADRANGLE.**

**Waukesha west along Chicago & Northwestern Railway to Dousman** (double-rodged line).

Waukesha, 2.1 miles west of, west end of south abutment of railroad bridge 1074, point on top of; square-----	826.99
Waukesha, 5.05 miles west of, in south abutment of railroad culvert 1080; aluminum tablet stamped "861 MILWAUKEE 1903"-----	861.084
Wales, 300 feet east of station, north abutment of railroad bridge 1088; aluminum tablet stamped "1003 MILWAUKEE 1903"-----	1,002.594
Wales, 3.6 miles west of, in wooden support of railroad trestle 1098, east end, south side; iron pin-----	801.45
Dousman, 5 miles west of Wales, in south end of railroad culvert 1,000 feet west of railroad station; aluminum tablet stamped "866 MILWAUKEE 1903"-----	866.298

**Waukesha north via Pewaukee and near Morton to sec. 5, T. 9 N., R. 19 E.**

Pewaukee, road crossing at middle of north line of sec. 33, 35 feet north by 25 feet west of road intersection; iron post stamped "951"-----	951.465
Pewaukee village, where Main Street crosses Chicago, Milwaukee & St. Paul Railway tracks, NE. $\frac{1}{4}$ sec. 8, 30 feet north by 90 feet west of road intersection; iron post stamped "855"-----	855.683

# 30 SPIRIT LEVELING IN MICHIGAN AND WISCONSIN, 1897 TO 1909.

Lisbon, east of middle of north line of sec. 29, 20 feet north by 60 feet west of road intersection; iron post stamped "1046"-----	Feet. 1,046.385
Lisbon, middle of north line of sec. 18, 35 feet west by 25 feet south of intersection of roads; iron post stamped "996"-----	995.893
Merton, center of W. $\frac{1}{2}$ sec. 1, 20 feet south by 35 feet east of road intersection; iron post stamped "1058.7"-----	1,058.733
Richfield, road crossing at northeast corner of sec. 30, 20 feet north by 30 feet east of road intersection; iron post stamped "1093"-----	1,092.559

## Dousman north via Giffords, Mapleton, and near Alderly to sec. 25, T. 10 N., R. 17 E.

Summit, road crossing at northeast corner of sec. 21, 30 feet north by 40 feet east of road intersection; iron post stamped "880"-----	880.350
Summit, road intersection just north of center of N. $\frac{1}{2}$ sec. 3, 90 feet south by 20 feet west of; iron post stamped "866"-----	866.083
Oconomowoc, middle of east line of sec. 22, 75 feet south by 30 feet east of road crossing; iron post stamped "892"-----	892.224
Oconomowoc, northeast corner of sec. 10, road crossing, 35 feet west by 20 feet south of; iron post stamped "922"-----	921.473
Ashippun, road crossing at northeast corner of sec. 27, 50 feet east by 20 feet south of; iron post stamped "939"-----	939.757
Alderly, 3 miles northeast of, northeast corner of sec. 30, 15 feet south by 40 feet west of road crossing; iron post stamped "985"-----	984.824

## Pewaukee west along Chicago, Milwaukee & St. Paul Railway to Gifford.

Delafield, road crossing Chicago, Milwaukee & St. Paul Railway tracks near middle of west line of sec. 2, 20 feet east by 40 feet north of intersection; iron post stamped "928"-----	927.707
Richfield, village of Nashota, where road crosses Chicago, Milwaukee & St. Paul Railway tracks, on west line of sec. 5, 70 feet east of center of road, 45 feet north of tracks; iron post stamped "940"-----	939.960

## Nagawicka 3 miles north.

Merton, middle of north line of sec. 28, 25 feet north by 40 feet west of road intersection; iron post stamped "935"-----	935.043
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## WATERLOO QUADRANGLE.

### Louden north along highways to Waterloo, thence east and north to point near Hubbleton.

T. 7 N., R. 13 E., near center of section 8, 42 feet southeast of road intersection, 2.9 feet north of fence, 18 feet east of southeast corner fence post, in southeast corner of crossroads; iron post stamped "870"-----	870.040
T. 7 N., R. 13 E., near north center of section 5, in southeast corner of T road intersection from southeast, in tree; nail marked "851.7"-----	851.77
T. 8 N., R. 13 E., 0.25 mile south of the northeast corner of section 30, 3.2 miles south of Waterloo station, 38 feet east of T road intersection from west, 3 feet west of fence; iron post stamped "Prim. Trav. Sta. No. 3, 875"-----	874.998

T. 8 N., R. 13 E., near south center of section 5, 0.8 mile east of center of town of Waterloo, 3 feet north of telephone pole, in northeast corner of T road intersection from north, 45 feet northeast of road intersection; iron post stamped "819"-----	Feet. 819. 194
T. 9 N., R. 13 E., near center of section 34, 3.5 miles northeast of Waterloo, 3.8 feet south of telephone pole, 69 feet northwest of road forks, in northwest angle of fork road from north; iron post stamped "859"-----	859. 027
T. 9 N., R. 13 E., center of section 26, 6 feet southeast of intersection of crossroads, 4.3 feet west of fence; iron post stamped "852"-----	852. 210
Hubbleton, near northwest corner of sec. 6, T. 8 N., R. 14 E., at road crossing west of station; top of north rail, marked "795.4"-----	795. 32
Hubbleton, 1 mile east of, near northeast corner of sec. 5, T. 8 N., R. 14 E., 4 feet east of corner fence post opposite T road from south, 25 feet northeast of road forks; iron post stamped "816"---	815. 769
<b>Point near Hubbleton east along Chicago, Milwaukee &amp; St. Paul Railway to point near Watertown, thence south by road 3 miles, east to Chicago &amp; Northwestern Railway and along track to Jefferson Junction.</b>	
T. 8 N., R. 13 E., at northeast corner of section 3, 3.5 miles east of Hubbleton, 2 feet north of fence, 36 feet southwest of road intersection, 12 feet west of southwest corner fence post; iron post stamped "831"-----	830. 954
T. 9 N., R. 14 E., northeast corner of section 27, 2.5 feet west of fence, 30 feet southeast of forks of road, 6 feet south of southeast corner fence post at T roads; iron post stamped "829"-----	828. 819
T. 8 N., R. 14 E., southeast corner of section 13, 42 feet south of road, 2.3 feet west of porch, 3.6 feet north of building, at northwest corner of schoolhouse; iron post stamped "819"-----	819. 192
T. 7 N., R. 15 E., center of section 31, 55 feet east of track, 3.6 feet north of fence in southeast angle of road crossing; iron post stamped "819.6"-----	819. 474
T. 7 N., R. 14 E., near east center of section 13, 200 feet west of track at Johnsons Creek station, 15 feet north of road, 3 feet south of fence, 3 feet from telephone pole at forks of road; iron post stamped "799.3"-----	799. 106
Jefferson Junction, near south center of sec. 25, T. 7 N., R. 14 E., opposite water tower; top of rail-----	804. 46
<b>Helenville west along Chicago &amp; Northwestern Railway to Lake Mills (double-rodded line).</b>	
Helenville, 3.3 miles west of, point on top of south end of railroad culvert 1142-----	805. 79
Jefferson Junction, 5.1 miles west of Helenville, 200 feet east of station, in top of east stone railroad culvert, east of "Y"; aluminum tablet stamped "813 MILWAUKEE 1903"-----	812. 787
T. 7 N., R. 14 W., northeast corner sec. 29, 3.4 miles west of Jefferson Junction, on east abutment of railroad bridge across Crawfish River; aluminum tablet stamped "802 ADJ 1903"-----	801. 830
Lake Mills, in front of station; top of rail-----	859. 6
Lake Mills, northeast corner of sec. 23, T. 7 N., R. 13 E., 117 feet south by 81 feet east of southeast corner of station; iron post stamped "862 ADJ 1903"-----	862. 236

## 32 SPIRIT LEVELING IN MICHIGAN AND WISCONSIN, 1897 TO 1909.

**Jefferson Junction south along Chicago & Northwestern Railway to Jefferson**  
(double-rodde line).

Jefferson, in foundation wall of courthouse, 10 feet north of center	Feet.
of west face; aluminum tablet stamped "815 MILWAUKEE 1903"	814.720

### WATERTOWN QUADRANGLE.

**Dousman west along Chicago & Northwestern Railway to Helenville** (double-rodde line).

Golden Lake station, 3.8 miles west of Dousman, 225 feet east of station, 35 feet south of highway crossing, 15 feet south of track; iron post stamped "864 MILWAUKEE 1903"	863.886
Sullivan, 1.6 miles west of, 0.3 mile west of Golden Lake, in south end of railroad culvert; aluminum tablet stamped "850 MILWAUKEE 1903"	850.411
Sullivan, 3.5 miles west of, on top of south end of railroad culvert 1124; square	836.87
Helenville, in north abutment of railroad culvert 1131, 500 feet west of station; aluminum tablet stamped "852 MILWAUKEE 1903"	851.929

**Bench marks established in the Watertown quadrangle in connection with levels of the Waterloo quadrangle.**

T. 8 N., R. 15 E., east center of sec. 6, 12 feet southwest of fork road to south, 2.2 feet north and 2 feet west of southwest corner fence post, 1 mile east of Watertown; iron post stamped "855.7"	855.645
T. 8 N., R. 15 E., in southern part of sec. 17, 55 feet west of track, 3 feet east of fence, 3 miles south of Watertown, at private road crossing; iron post stamped "801"	801.168

### KOSHKONONG QUADRANGLE.

**Jefferson south along Chicago & Northwestern Railway to Milton Junction.**

Fort Atkinson, 6 feet south of railroad water tank; iron post stamped "796 MILWAUKEE 1903"	795.895
Fort Atkinson, 5.1 miles south of, top of west end of south abutment of railroad bridge 164; chiseled square	821.96
Koshkonong, 10 feet from southeast corner of station; iron post stamped "821 MILWAUKEE 1903"	820.949
Milton Junction, 100 feet north of intersection of Chicago & Northwestern and Chicago, Milwaukee & St. Paul railways, 25 feet east of tracks; iron post stamped "881 MILWAUKEE 1903"	881.258

**Milton Junction east along Chicago, Milwaukee & St. Paul Railway to White-water, thence along highway northwest to Fort Atkinson.**

Milton, 2.2 miles east of, top of west end of south abutment of railroad bridge 114; square	885.33
Lima, 150 feet east of station, 15 feet north of track, near highway crossing; iron post stamped "894 MILWAUKEE 1903"	894.335
Lima, 3 miles east of, in north end of railroad sluiceway 96; square	884.62
Jefferson, 7 miles southwest of, Oakland Township, in southeast corner of school yard (district No. 7); iron post stamped "888 MILWAUKEE 1903"	888.253

Jefferson, 10.4 miles southwest of, Sumner Township, northeast corner of school yard (district No. 7); iron post stamped "810 MILWAUKEE 1903"-----Feet.  
809.925

#### WHITEWATER QUADRANGLE.

##### At Whitewater.

Whitewater, 45 feet southwest of southwest corner of freight house, 18 feet south of track; iron post stamped "824 MILWAUKEE 1903"-----823.885

#### SUN PRAIRIE QUADRANGLE.

Lake Mills west along Chicago & Northwestern Railway to point 2.3 miles west of Cottage Grove (double-rodged line).

London, stone culvert, north side of track just east of station; aluminum tablet stamped "868 ADJ 1903"-----868.481  
London, in front of station; top of rail-----868  
Deerfield, in front of station; top of rail-----860.9  
Deerfield, sec. 21, T. 7 N., R. 12 E., 165 feet north by 69 feet east of station, north side of railroad, west side of highway; iron post stamped "859 ADJ 1903"-----859.618  
T. 7 N., R. 12 E., 0.25 mile east by 0.1 mile south of northwest corner of sec. 20, east side of county road, 30 feet south of track, at crossing; iron post stamped "871 ADJ 1903"-----871.113  
Cottage Grove, 0.3 mile east of, on northeast corner of stone bridge 1205; aluminum tablet stamped "878 ADJ 1903"-----877.984  
Cottage Grove, in front of station; top of rail-----889.4  
Cottage Grove, 2.3 miles west of, near center of sec. 18, T. 7 N., R. 11 E., 1,830 feet east of county road, in bridge 1213; aluminum tablet stamped "874 ADJ 1903"-----873.842

Cottage Grove north via Sun Prairie to T. 9 N., R. 11 E., thence east to R. 12 E., thence south to Deerfield.

T. 7 N., R. 11 E., 0.25 mile south of north quarter corner of sec. 4, on west side of road, 2 feet east of fence, 5 feet north of fence corner, crossroads, at southeast corner of schoolhouse grounds; iron post stamped "935 ADJ 1903"-----934.640  
T. 8 N., R. 11 E., near west quarter corner of sec. 21, at intersection of east-west road with road to north, on south side of road; iron post stamped "926 ADJ 1903"-----925.672  
Sun Prairie, T. 8 N., R. 11 E., in SE.  $\frac{1}{4}$  sec. 5 on south side of lawn around water tower, 1 foot north of fence; iron post stamped "991 ADJ 1903"-----991.291  
T. 9 N., R. 11 E., 0.1 mile north of southwest corner of sec. 26, 15 feet north of fence corner at road intersection, west side of road; iron post stamped "959 ADJ 1903"-----959.407  
T. 9 N., R. 11 E., southeast corner of sec. 24, 0.25 mile north of intersection, 2 feet south of fence, 12 feet east of fence corner, north side of road; iron post stamped "881 ADJ 1903"-----881.105  
T. 9 N., R. 12 E., southeast corner of sec. 20, 25 feet west of fence corner at crossroads, 1.5 feet south of fence, north side of road; iron post stamped "892 ADJ 1903"-----892.394



### 34 SPIRIT LEVELING IN MICHIGAN AND WISCONSIN, 1897 TO 1909.

T. 8 N., R. 12 E., north quarter corner of sec. 3, 10 feet west of fence corner at road intersection, south side of road; iron post stamped "916 ADJ 1903"-----	Feet. 915.630
Marshall district schoolhouse, near southeast corner of grounds, between two large maples; iron post stamped "859 ADJ 1903"-----	858.840
T. 8 N., R. 12 E., 0.25 mile south of northeast corner of sec. 28, 13 feet east of fence corner at road intersection, north side of road; iron post stamped "867 ADJ 1903"-----	867.045
T. 8 N., R. 12 E., near center of sec. 33, at southwest corner of road intersection, 2 feet east of fence; iron post stamped "922 ADJ 1903"-----	922.122
T. 7 N., R. 12 E., SE. $\frac{1}{4}$ sec. 9, 10 feet north of fence corner at cross-roads, east side of road; iron post stamped "877 ADJ 1903"-----	876.846

#### MADISON QUADRANGLE.

Point 2.3 miles west of Cottage Grove west along Chicago & Northwestern Railway to Madison (double-rodded line).

T. 7 N., R. 10 E., 0.25 mile south of northeast corner of sec. 16, 200 yards east of road crossing, bridge 1225; aluminum tablet stamped "896 ADJ 1903"-----	895.994
T. 7 N., R. 10 E., 0.25 mile north by 0.25 mile west of southeast corner of sec. 6, in stone culvert near road crossing; aluminum tablet stamped "864 ADJ 1903"-----	864.081
Madison, university grounds, between east pillars of south entrance of Engineering Building, 79 feet west from southeast corner, 96.1 feet east of southwest corner of building; aluminum tablet stamped "924 ADJ 1903"-----	924.239
Madison, university grounds, in water table, south end of east arch of main hall, 2.3 feet north of south end of arch; aluminum tablet stamped "961 ADJ 1903"-----	961.298

Point northeast of Madison northwest along Chicago & Northwestern Railway via Mendota to Waunakee (forward and backward spur line).

Mendota, 0.5 mile south of, sec. 26, T. 8 N., R. 9 E., in stone abutment of railroad bridge 259; tablet stamped "886 ADJ 1903"-----	886.270
Waunakee, in front of station; top of rail-----	926
Waunakee, 1,300 feet north of, on west end of south abutment of railroad bridge 274; aluminum tablet stamped "925 ADJ 1903"-----	925.274
Waunakee, 0.8 mile northwest of road crossing, 0.25 mile northeast of center of sec. 6, T. 8 N., R. 9 E., in west abutment of railroad bridge 280; tablet stamped "938 ADJ 1903"-----	938.509

Point northeast of Madison north along Chicago, Milwaukee & St. Paul Railway to sec. 5, T. 9 N., R. 10 E. (forward and backward spur line).

T. 8 N., R. 10 E., 0.25 mile east of center of sec. 30, 30 feet south of county road, on east side of track; iron post stamped "885 ADJ 1903"-----	885.215
Windsor, 0.5 mile south of station at, T. 9 N., R. 10 E., sec. 29, in stone culvert; tablet stamped "887 ADJ 1903"-----	886.927

**Madison southwest along Illinois Central Railroad and Chicago & Northwestern Railway and return.**

T. 7 N., R. 9 E., 0.25 mile east of southwest corner of sec. 32, 30 feet east of track at road crossing, south of county road; iron post stamped "1003 ADJ 1903"-----	Feet. 1,002.944
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**Madison south to Syene and return along Chicago & Northwestern Railway.**

Syene, 1,500 feet north of station, sec. 11, T. 6 N., R. 9 E., in stone culvert; tablet stamped "895 ADJ 1903"-----	894.917
Syene, in front of station; top of rail-----	896.8

**EVANSVILLE QUADRANGLE.****Syene south along Chicago & Northwestern Railway to Oregon and return.**

T. 6 N., R. 9 E., sec. 26, 800 feet north of crossing of section line between secs. 26 and 35 and railroad, in stone abutment of bridge 217; tablet stamped "939 ADJ 1903"-----	939.581
T. 5 N., R. 9 E., 0.4 mile west of center of sec. 1, 0.5 mile north of Oregon, in stone abutment of railroad bridge just north of road crossing; tablet stamped "944 ADJ 1903"-----	943.795

**Oregon along highway east 6 miles, thence south to Evansville, thence west to Attica, thence north and east to Oregon.**

T. 6 N., R. 10 E., 0.25 mile east of southwest corner of sec. 35, north side of east-west road opposite intersection of north-south road; iron post stamped "935 ADJ 1903"-----	935.302
T. 5 N., R. 10 E., 0.25 mile north of southeast corner of sec. 15, north side of east-west road, opposite intersection by a road north-south; iron post stamped "910 ADJ 1903"-----	910.303
Union, 0.25 mile west of center of sec. 10, T. 4 N., R. 10 E., at northwest corner of crossroads; iron post stamped "944 ADJ 1903"-----	944.219
Evansville, sec. 27, T. 4 N., R. 10 E., in water table of city hall, 3 feet south of northeast corner; tablet stamped "918 ADJ 1903"-----	918.117
T. 3 N., R. 9 E., northeast corner of sec. 1, at south corner of two formed by intersection of east-west and north-south roads, 10 feet west of corner post; iron post stamped "985 ADJ 1903"-----	985.432
T. 3 N., R. 9 E., northwest corner sec. 5, on south side of east-west road and opposite intersection of north-south road; iron post stamped "820 ADJ 1903"-----	828.729
T. 4 N., R. 9 E., 0.25 mile west of southeast corner of sec. 7, 15 feet west of fence corner, the west corner of two corners formed by intersection of east-west and north-south roads; iron post stamped "912 ADJ 1903"-----	912.597
T. 5 N., R. 9 E., northwest corner of sec. 33, 60 feet east of diagonal road at junction of three roads, in northwest corner of schoolhouse yard; iron post stamped "898 ADJ 1903"-----	898.353
T. 5 N., R. 9 E., 0.5 mile north of center of sec. 9, 54 feet south of crossroads, east side of north-south road; iron post stamped "954 ADJ 1903"-----	954.592

**Hartford, Juneau, and West Bend Quadrangles.****DODGE, OZAUKEE, AND WASHINGTON COUNTIES.**

The elevations in the following list were determined by primary levels extended from United States Lake Survey bench mark No. 2, a stone monument near the southeast corner of the courthouse square in Milwaukee, the accepted elevation of which is 636.056 feet above mean sea level.

The leveling was done in 1901 by I. C. Sunderland.

**WEST BEND QUADRANGLE.**

**Milwaukee northwest along Chicago & Northwestern Railway to Rockfield, thence east to sec. 23, T. 10 N., R. 21 E., thence north 1.5 miles north of Horns Corners (double-rodged line).**

T. 10 N., R. 20 E., southeast corner of, 30 feet west by 25 feet north of center of road intersection, on line between Washington and Ozaukee Counties; iron post stamped "875.95 MIL"-----	Feet. 876.201
T. 10 N., R. 21 E., northeast corner of section 17, 37 feet southwest of section stone, in center of roads; iron post stamped "847.900 MIL"-----	848.168

**Point near Horns Corners west along north side of Jackson Township to northwest corner, thence south and southeast to Rockfield.**

T. 10 N., R. 20 E., 0.1 mile east of northwest closing corner of section 1, 2 feet south of section stone, at southeast corner of sec. 35, T. 11 N., R. 20 E.; iron post stamped "879.270 MIL"-----	879.536
T. 11 N., R. 19 E., southwest corner of section 36, West Bend Township, 20 feet north of road going east; iron post stamped "1006.900 MIL"-----	1,007.167
T. 10 N., R. 20 E., at southwest corner of, 20 feet east by 50 feet north of center of intersection of roads; iron post stamped "809.819 MIL"-----	800.002

**Northwest corner of Jackson Township north along public road via West Bend and Barton to sec. 24, T. 12 N., R. 19 E., thence east to Fillmore and south via Newburg to Horns Corners.**

West Bend, in front face of courthouse, at right of entrance, aluminum tablet stamped "942.80 MIL"-----	943.089
T. 12 N., R. 19 E., near center of NW. $\frac{1}{4}$ sec. 24, 2 miles east by 8 miles south of Kewaskum; iron post stamped "968.474 MIL"-----	968.749
T. 12 N., R. 20 E., northwest corner of section 24, 55 feet south by 16 feet east of center of road; iron post stamped "847.716 MIL"-----	847.971
Newburg, sec. 12, T. 11 N., R. 20 E., on front corner of brick saloon opposite mill, in stone above water table; bronze tablet stamped "850.278 MIL"-----	850.525

**HARTFORD QUADRANGLE.**

**West Bend along public road west via Horseshoe Hill and Aurora to Kohlsville.**

Aurora, southwest corner of sec. 12, T. 11 N., R. 18 E., in southwest corner of brick building at northeast corner of intersection of road; bronze tablet stamped "1146.169 MIL"-----	1,146.577
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Kohlsville, at northwest corner of sec. 35, T. 12 N., R. 18 E., at southeast corner of intersection of roads; iron post stamped "1013.153 Feet.  
MIL"----- 1,013.640

Horseshoe south along public road west of Cedar Lake to Schleisingserville,  
thence east to Jackson Township.

Schleisingserville, sec. 18, T. 10 N., R. 19 E., 300 feet southwest of  
post office, in butcher shop, in brick; bronze tablet stamped "1068.964  
MIL"----- 1,069.192

Southwest corner of Jackson Township west along public road via Oil Spring  
Farm, thence north via Hartford to Aurora.

T. 9 N., R. 19 E., northwest corner of section 5, 2 miles south by 1  
mile west of Ackerville, 15 feet south and east from center of inter-  
section of roads; iron post stamped "1093.033 MIL"----- 1,093.394

Kohlsville west along public road to sec. 30, Theresa Township, thence south-  
west to Woodland.

T. 12 N., R. 17 E., southeast corner of section 24, at northwest corner  
of intersection of road; iron post stamped "1025.785"----- 1,026.072

T. 11 N., R. 17 E., 190 feet south by 17 feet west of northeast corner  
of section 6; iron post stamped "1060.005 MIL"----- 1,060.422

T. 11 N., R. 17 E., northeast corner of section 36, 3 miles east of  
Hullsburg; iron post stamped "1072.070 MIL"----- 1,072.464

Hartford southwest along public road via Saylesville to southwest corner of  
sec. 32, Rubicon Township, thence north via Neosho to Woodland.

Hartford, southeast corner of city hall, in limestone water table;  
bronze tablet stamped "932.977 MIL"----- 983.345

T. 10 N., R. 17 E., sec. 25, at intersection of roads; iron post stamped  
"976.856 MIL"----- 977.233

#### JUNEAU QUADRANGLE.

Neosho north along highways to Woodland.

Neosho, 1 mile south of, at southeast corner of sec. 30, T. 10 N., R. 17  
E.; iron post stamped "922.984 MIL"----- 923.366

Woodland, east of southwest corner of sec. 31, T. 11 N., R. 17 E.;  
iron post stamped "946.069 MIL"----- 946.460

Appleton, Fisk, Fond du Lac, Kiel, Menasha, and Oshkosh Quadrangles.

#### CALUMET, FOND DU LAC, OUTAGAMIE, AND WINNEBAGO COUNTIES.

The elevations in the following list were determined by primary  
leveling extended from United States Army engineers' bench marks  
at Fond du Lac, Oshkosh, Appleton, and Menasha.

The leveling was done in 1908 by E. M. Bandli.

**KIEL QUADRANGLE.**

Sec. 29, T. 16 N., R. 19 E., north along highways to sec. 8, T. 16 N., R. 19 E.

T. 16 N., R. 19 E., sec. 29, 10.5 feet from northeast corner of road intersection, 3.6 feet north of tree 48 feet northwest of road intersection at east center of section 29; iron post stamped "993"-----	Feet 992.533
T. 16 N., R. 19 E., near southeast corner of section 20, opposite T road intersection from south; on top of rock-----	963.10
T. 16 N., R. 19 E., near southwest corner of section 8, opposite T road intersection from west, 15 feet east of road intersection and 12 feet northwest of oak tree, in large stone; aluminum tablet stamped "967"-----	966.627

**FOND DU LAC QUADRANGLE.**

Fond du Lac east along highways to Dotyville, thence north along highways to sec. 32, T. 16 N., R. 19 E.

Fond du Lac, in top of surface of top course of stone, north wing of right abutment of Scott Street bridge, 28.8 feet from face of abutment; copper bolt-----	753.966
Fond du Lac, in northeast corner of courthouse, in sill of second window from east, leading under step entrance from east; aluminum tablet stamped "764"-----	764.034
T. 15 N., R. 18 E., near center of section 18, township of Empire, 100 feet west of center of crossroads, 1.5 feet north of fence, 6.5 feet from northwest corner of school yard; iron post stamped "852"-----	851.632
T. 15 N., R. 18 E., at center of section 15, township of Empire, in southeast corner of T road intersection, on top of rock; marked "1005"-----	1,004.50
T. 15 N., R. 18 E., near east center of section 15, township of Empire, 100 feet southeast of road intersection from north (T road), 4 feet from telephone pole, 2 feet north of fence; iron post stamped "1014"-----	1,014.082
T. 15 N., R. 18 E., near center of section 14, township of Empire, in southeast corner of T road intersection, on stone; marked "1,019"-----	1,019.09
Dotyville, in Catholic Church, 2 feet above ground, 0.6 foot from northwest corner in highest course of stone masonry, near southeast corner of sec. 19, T. 15 N., R. 19 E.; aluminum tablet stamped "1041"-----	1,040.806
T. 15 N., R. 19 E., at northeast corner of section 19, township of Forest, at southeast corner of intersection of T road from east, in root of tree; nail marked "1044"-----	1,044.06
T. 15 N., R. 19 E., at east center of section 7, township of Forest, 5 feet south of southeast corner fence post under fence in school yard, in large stone 56 feet from road intersection from southeast; aluminum tablet stamped "966"-----	966.407

Sec. 5, T. 16 N., R. 19 W., to a point 2 miles north of Brothertown.

T. 16 N., R. 19 E., near southwest corner of section 6, township of Marshfield, 0.5 mile east of Hinesburg, opposite T road from north, chisel mark on large rock, marked "981"-----	980.37
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T. 16 N., R. 19 E., in northeast corner of sec. 6, township of Marshfield, 54 feet northwest of road intersection, 2.5 feet east of fence, 40 feet north of northwest corner fence post, in northwest corner of T road intersection; iron post stamped "971"-----	Feet. 970.624
T. 17 N., R. 19 E., in northeast corner of sec. 24, 45 feet southeast of T road intersection, in southeast corner, 2.2 feet from fence, 8 feet north of tree; iron post stamped "894"-----	893.473
Brothertown, 2 miles southeast of, in northwest corner of T road intersection from west, in root of large tree; nail marked "906"---	906.20
Brothertown, 96 feet northwest of road intersection, opposite T road intersection from east, 1 foot east of fence; iron post stamped "813"-----	813.070

**Sec. 17, T. 16 N., R. 17 E., to Fond du Lac.**

T. 16 N., R. 17 E., near southeast corner of sec. 17, 100 feet east of street car line, 2.2 feet south of fence, north of road; iron post stamped "783"-----	782.601
North Fond du Lac, 45 feet southwest of intersection of crossroads, in southwest corner, 7 feet west of sidewalk and 3 feet north; across from McGivern Hotel; iron post stamped "767"-----	766.424

**FISK QUADRANGLE.**

**Sec. 12, T. 17 N., R. 16 E., south along Chicago & Northwestern Railway to sec. 8, T. 16 N., R. 17 E., about 1 mile south of Vandyne.**

T. 17 N., R. 16 E., near north center of sec. 12, 5 miles north of Vandyne, 50 feet from railroad tangent west, 1.6 feet north of Chicago & Northwestern Railway fence, 3 feet east of fence; iron post stamped "774"-----	773.599
T. 17 N., R. 17 E., northeast corner of sec. 24, 2.3 feet north of northeast corner schoolhouse at Black Wolf; iron post stamped "799"-----	798.760
T. 17 N., R. 17 E., near south center of sec. 31, 33 feet southwest of Wisconsin Central Railway crossing, 2.3 feet north of fence; iron post stamped "790"-----	790.022

**OSHKOSH QUADRANGLE.**

**Sec. 16, T. 19 N., R. 17 W. south along Chicago & Northwestern Railway to sec. 36, T. 18 N., R. 16 E., about 2.8 miles south of Oshkosh.**

State Hospital station, 1 mile north of, in northern part of sec. 30, T. 19 N., R. 17 E., 0.7 foot from northwest corner of foundation, in northwest corner of bridge 352; aluminum tablet stamped "771"-----	771.144
T. 18 N., R. 16 E., near center of sec. 1, 1.2 feet from northwest corner of foundation of bridge 345, 0.6 foot from edge; aluminum tablet stamped "754"-----	753.934
Oshkosh, Chicago & Northwestern Railway bridge at Broad Street (United States Army engineers' bench mark)-----	751.716

# 40 SPIRIT LEVELING IN MICHIGAN AND WISCONSIN, 1897 TO 1909.

Oshkosh, corner of Otter and State streets, in south end of stone threshold of east entrance of city hall; copper bolt (United States Army engineers' bench mark)-----	Feet. 755.389
Oshkosh, one block east of city hall, in west side of county jail, 2 feet south of door in highest course of stone; aluminum tablet stamped "758"-----	758.314

## MEWASHA QUADRANGLE.

Quinney schoolhouse north along highway to sec. 5, T. 20 N., R. 18 E.

Quinney, 2 feet east of northeast corner of schoolhouse, 2.5 feet south of same corner; iron post stamped "871"-----	870.428
Stockbridge, 1 mile south of, 66 feet northwest of T road intersection, 25 feet north of northwest corner and 2 feet east of fence; iron post stamped "849"-----	848.778
Stockbridge, 1.6 miles north of, 400 feet west of road back of schoolhouse, 15 feet north of southwest corner of tree, 2.8 feet east of fence, in ledge of rock in southwest corner of school yard; aluminum tablet erroneously stamped "960"-----	985.808
T. 19 N., R. 19 E., southeast corner of sec. 6, township of Harrison, in southeast corner of school yard, 2 feet north of fence and 9 feet southwest of tree at corner; iron post stamped "990"-----	979.894
T. 20 N., R. 19 E., in northwest corner of Church schoolhouse at Sherwood, 4.2 feet above ground and 0.5 foot from corner; aluminum tablet stamped "904"-----	904.155
T. 20 N., R. 18 E., east center of sec. 12, township of Harrison, in southeast corner of crossroads, 18 feet from southeast corner fence post, 63 feet west of road intersection and 1.7 feet north of fence; iron post stamped "778"-----	777.984
T. 20 N., R. 18 E., at north center of sec. 2, on north line of Calumet County, 2.5 feet from fence corner, 33 feet from road intersection from south, 15 feet west of tree; iron post stamped "766"-----	765.485
T. 20 N., R. 18 E., near northeast corner of sec. 3, on north line of Calumet County, at T road intersection from south, on stone culvert; marked "748"-----	747.64
Appleton, 3 miles southeast of, T. 20 N., R. 18 E., at northeast corner of sec. 5, on Calumet County line, 46 feet south of road intersection, 2.5 feet from fence; iron post stamped "789"-----	788.308

Sec. 12, T. 20 N., R. 17 E., south along Chicago & Northwestern Railway to road crossing at Snell, sec. 8, T. 19 N., R. 17 E.

Menasha, in northeast pillar in front entrance of Menasha High School, 4 feet from ground, set in support of pillar 2 inches from east edge; aluminum tablet stamped "766"-----	766.511
T. 20 N., R. 17 E., near north center of sec. 33, 2 miles south of Neenah, in third course of stone in northeast corner of Chicago & Northwestern Ry. bridge 360, 1.2 feet from northeast corner of foundation; aluminum tablet stamped "749"-----	749.475
T. 19 N., R. 17 E., near southeast corner of sec. 5, in southwest corner of bridge 357, of Chicago & Northwestern Ry., 1 foot north of southwest corner, 6 inches from west corner; aluminum tablet stamped "760"-----	760.353

## APPLETON QUADRANGLE.

Point about 1.7 miles southeast of Appleton to Appleton, thence southwest along Chicago, Milwaukee & St. Paul Railway to point about 2.9 miles south of Appleton.

Appleton, Lock No. 1, in upper left-hand corner of the right head wall of lock, 4 inches from edge of stone; copper plug (United States Army engineers' bench mark)-----	Feet. 741.841
Appleton, near southeast corner of county jail, in stone step of porch, 3 inches from pillar and 3 inches from east edge; aluminum tablet stamped "790"-----	790.394
Appleton, 2.5 miles southwest of, 23 feet south of middle of road, 2.5 feet north of fence, about 30 feet east of Chicago, Milwaukee & St. Paul Railway, tangent in northeast corner of Winnebago County on county line; iron post stamped "786"-----	785.873

## Briggsville, Portage, and Poynette Quadrangles.

## ADAMS, COLUMBIA, DANE, MARQUETTE, AND SAUK COUNTIES.

The elevations in the following list were determined by primary leveling extended from the United States Army engineers' bench mark at Portage, 25 feet to the right of the face of right wall of old Lock No. 1, 84.6 feet above the upper end of upper gate recess of new lock, a copper bolt in tile under a hollow iron post sunk 4 feet in ground. The elevation of this is accepted as 787.273 feet above mean sea level, as determined by the United States Army engineers' leveling from Milwaukee.

The leveling in the Briggsville quadrangle was done in 1900 by R. E. Wipfler, and that in the Portage and Poynette quadrangles in 1899 by L. E. Granke.

Nearly all the standard bench marks are stamped 4 feet high.

## POYNETTE QUADRANGLE.

Portage south along highways to point 0.25 mile south of northwest corner of sec. 11, T. 9 N., R. 9 E., thence east to southeast corner of sec. 5, T. 9 N., R. 10 E., thence north to point 0.25 mile east of center of sec. 20, T. 11 N., R. 10 E.

Arlington, 1 mile west of, southeast corner of sec. 15, T. 10 N., R. 9 E., 5 feet west by 2.5 feet south of fence corner; iron post stamped "1066 PRTG"-----	Feet. 1,061.832
T. 9 N., R. 9 E., 0.25 mile south of northwest corner of sec. 11, 38 feet east by 2 feet south of most easterly fence corner at intersection of roads; iron post stamped "984 PRTG"-----	980.358
T. 9 N., R. 10 E., at southeast corner of sec. 5, 4.4 feet east by 16 feet north of northwest fence corner at crossroads; iron post stamped "961 PRTG"-----	957.318
T. 10 N., R. 10 E., 0.25 mile north of southeast corner of sec. 17, 5 feet north by 3 feet west of northeast corner of Leeds schoolhouse (district No. 7); iron post stamped "1092 PRTG"-----	1,088.362



## 42 SPIRIT LEVELING IN MICHIGAN AND WISCONSIN, 1897 TO 1909.

Poynette east along highways to point 0.25 mile east of center of sec. 20, T. 11 N., R. 10 E., thence north to center of sec. 21, T. 12 N., R. 10 E.

Poynette, 2.5 feet east by 4.5 feet north of northwest corner of Presbyterian Church at corner of Main and Tomlinson streets; iron post stamped "857 PRTG"-----	Feet. 853.061
T. 11 N., R. 10 E., 0.25 mile east of center of sec. 20, 2.5 feet west by 10 feet north of fence corner at northeast corner of crossroads; iron post stamped "906 PRTG"-----	962.242
T. 12 N., R. 10 E., center of sec. 21, 9.9 feet north by 2.8 feet west of fence corner, the most northerly of the two formed by intersection of roads; iron post stamped "830 PRTG"-----	826.276

### PORTAGE QUADRANGLE.

Portage north along highways to point 0.25 mile east of southwest corner of sec. 27, T. 15 N., R. 9 E.

Portage, on old Lock No. 1, 25 feet to right of face of old lock, 84.6 feet above the upper end of upper gate recess of new lock; a copper bolt in tile under a hollow iron post sunk 4 feet in ground----	787.273
Portage, 28.5 feet west by 49.5 feet south of south end of wagon bridge over Wisconsin River, 2 feet east of fence on west side of road; iron post stamped "803 PRTG"-----	799.148
Portage, 182 feet south by 8.5 feet west of southeast corner of high school building, in United States Geological Survey meridian stone; copper bolt stamped "804 PRTG"-----	800.130
T. 13 N., R. 9 E., 0.5 mile north of center of sec. 15, 15.5 feet east by 9.5 feet north of southeast fence corner at crossroads; iron post stamped "837 PRTG"-----	823.429
T. 14 N., R. 9 E., 0.3 mile west by 0.05 mile south of northeast corner of sec. 14, 2 feet west of fence post at forks of roads, east of road; iron post stamped "804 PRTG"-----	800.377
T. 15 N., R. 9 E., 0.25 mile east of southwest corner of sec. 27, 2.2 feet east by 2 feet 7 inches north of southeast corner of school-house; iron post stamped "822 PRTG"-----	818.104

Wyocena north along highways to southeast corner of sec. 33, T. 15 N., R. 10 E.

T. 13 N., R. 13 E., northeast corner of sec. 21, 4 feet east by 1 foot south of fence corner, south corner of two formed by intersection of roads; iron post stamped "889 PRTG"-----	884.579
T. 14 N., R. 10 E., 0.5 mile south of center of sec. 22, 11.1 feet west by 18.3 feet south of the most easterly fence corner formed by intersection of roads; iron post stamped "922 PRTG"-----	918.306
T. 15 N., R. 10 E., at southeast corner of sec. 33, 17.9 feet by 2.5 feet east of intersection of fences on west side of road; iron post stamped "798 PRTG"-----	794.457

### BRIGGSVILLE QUADRANGLE.

Portage west and north along highways to quarter corner on west side of sec. 6, T. 13 N., R. 7 E.

T. 12 N., R. 8 E., near center of sec. 10, near forks of road; iron post stamped "800 PRTG"-----	795.664
T. 12 N., R. 7 E., about 0.25 mile east of northwest corner of sec. 11, at intersection of roads; iron post stamped "929 PRTG"-----	925.573

T. 13 N., R. 7 E., near quarter corner on west side of sec. 6, east side of road; iron post stamped "1016 PRTG"----- Feet.  
1,011.448

Quarter corner on west side of sec. 6, T. 13 N., R. 7 E., east along highways to southwest corner of sec. 33, T. 14 N., R. 8 E., thence southeast to Portage.

T. 14 N., R. 7 E., near center of sec. 33, north side of road; iron post stamped "941 PRTG"----- 937.235

T. 14 N., R. 8 E., at southwest corner of sec. 33, at northeast corner of intersecting roads; iron post stamped "813 PRTG"----- 808.674

T. 13 N., R. 8 E., near center of west half of sec. 21, at forks of roads; iron post stamped "801 PRTG"----- 797.334

**Marathon and Wausau Quadrangles.**

**LANGLADE, LINCOLN, MARATHON, AND TAYLOR COUNTIES.**

The elevations in the following list are not on the 1907 adjustment datum, and are only approximate. They were determined by primary leveling extended from Wausau, the initial point being the top of rail in front of the Chicago, Milwaukee & St. Paul Railway station, the elevation of which is accepted as 1,216 feet.

The leveling was done by Robert Wipfler in the Marathon quadrangle during 1899 and in the Wausau quadrangle during 1899 and 1900.

**WAUSAU QUADRANGLE.**

Wausau east along highways to Sunset, thence north and west to Merrill.

Wausau, at point opposite center of Chicago & Northwestern Railway station; top of rail----- Feet.  
1,167.0

Wausau, opposite Chicago, Milwaukee & St. Paul Railway station; top of east rail----- 1,216.0

T. 29 N., R. 8 E., sec. 23; stone abutment northwest corner iron bridge over Big Sandy Creek----- 1,282.05

T. 29 N., R. 8 E., northeast corner of sec. 24, opposite Sunset saloon, 15 feet southwest of south end of culvert, south side of road; iron post stamped "1355 W"----- 1,354.708

T. 30 N., R. 9 E., northeast corner of intersection of roads at southwest corner of sec. 31; iron post----- 1,458.665

T. 31 N., R. 7 E., sec. 22, in top of northwest pier of bridge over Pine River; top of bolt----- 1,268.23

T. 31 N., R. 7 E., about 0.2 mile east of corner secs. 15, 16, 21, and 22, at northwest corner of intersection of roads, at schoolhouse; iron post stamped "1305 W"----- 1,305.935

Merrill, Chicago, Milwaukee & St. Paul Railway crossing, River Street; top of rail----- 1,257.0

T. 31 N., R. 6 E., southeast corner of South Center and First streets, Merrill; iron post stamped "1267 W"----- 1,267.046

Southwest corner of sec. 31, T. 30 N., R. 9 E., east along township line to southwest corner of sec. 31, T. 30 N., R. 10 E. (spur line).

T. 30 N., R. 10 E., southwest corner of sec. 31, 10 feet north of center of road; iron post stamped "1465 W"----- 1,465.046

#### 44 SPIRIT LEVELING IN MICHIGAN AND WISCONSIN, 1897 TO 1909.

Merrill northeast along highways to Heller, thence east to Morley.

T. 31 N., R. 8 E., east side of road at northwest corner of intersection of roads at northwest corner of sec. 7-----	Feet. 1, 307. 520
T. 31 N., R. 9 E., northeast corner of sec. 1, 12 feet west of center of road, 50 feet south of bearing tree; iron post-----	1, 528. 703

Mosinee north along highways to Wausau.

Mosinee, T. 27 N., R. 7 E., southeast corner of Desserts public library; iron post stamped "1159 W"-----	1, 159. 491
Mosinee, in front of Chicago, Milwaukee & St. Paul Railway station; top of rail-----	1, 153. 9
Schofield, east side of Mosinee-Schofield road, 1 foot from board fence, T. 28 N., R. 7 E.; iron post-----	1, 163. 213

Point 1 mile south of Dessert Junction east along highways to range line, Rs. 7 and 8 E., T. 27 N. (spur line).

T. 27 N., R. 8 E., northwest corner of sec. 19, north side of road, at corner of wire fence, 20 feet northeast of intersection of roads; iron post-----	1, 280. 123
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Schofield east via Kelly to point near Birnamwood, thence south to point south of Elderon, thence west to point west of Bevant, thence north to Callon.<sup>1</sup>

Kelly, west side of road, 10 feet west of corner of fence diagonally opposite station; iron post stamped "1220 W"-----	1, 220. 045
T. 28 N., R. 9 E., north side of road, 1 foot from log fence about 10 feet east of corner of fence and about 300 feet west of house on north side of road; iron post-----	1, 236. 266
T. 29 N., R. 9 E., on top of bolt of east pier of Eau Claire River bridge-----	1, 250. 42
T. 29 N., R. 9 E., near quarter corner of sec. 33, on south side of road, 50 feet west of west end of Eau Claire bridge, corner of intersection of road; iron post-----	1, 248. 925
T. 29 N., R. 10 E., southwest corner of sec. 31, 20 feet north of center of road, 50 feet northeast of intersection of roads; iron post-----	1, 452. 271
T. 28 N., R. 10 E., east side of road running north-south, at corner of fence at Norrie, at intersection of roads 0.1 mile north of railroad crossing; iron post-----	1, 293. 125
T. 27 N., R. 10 E., near quarter corner of sec. 3, south side of road in front of school; iron post-----	1, 252. 233
T. 27 N., R. 9 E., sec. 34, Bevant post office, southeast corner of bridge over Plover River; top of bolt-----	1, 192. 93
T. 27 N., R. 9 E., sec. 6, east side of road, 100 feet from corner of fence, 200 feet north of house; iron post-----	1, 301. 432

Point 1 mile west of Emmerich east along highways to range line, Rs. 6 and 7 E., T. 30 N. (spur line).

T. 30 N., R. 7 E., northwest corner of sec. 18, at corner of fence; iron post stamped "1460 W"-----	1, 459. 304
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<sup>1</sup> This circuit is based upon a single line from Wausau.

## MARATHON QUADRANGLE.

Mosinee northwest along highways to point 3 miles west of Wein.

T. 27 N., R. 6 E., 200 feet east of northwest corner of NE $\frac{1}{4}$ sec. 29; iron post stamped "1293 W"-----	Feet. 1, 293. 198
T. 27 N., R. 5 E., northwest corner sec. 19, northeast corner of intersection of roads, 10 feet from corner of fence; iron post stamped "1182 W"-----	1, 182. 003
T. 27 N., R. 4 E., at northwest corner of NE $\frac{1}{4}$ sec. 22, at northeast corner of intersection of roads, 40 feet east of corner of rail fence, north side of road; iron post stamped "1243 W"-----	1, 242. 927
T. 27 N., R. 3 E., at northeast corner of sec. 1, southwest corner of intersection of roads, 15 feet west of center of road opposite corner of fence on east side; iron post stamped "1324 W"-----	1, 324. 442
T. 28 N., R. 4 E., northwest corner of sec. 19, southeast corner of intersection of roads, 2 feet from corner of fence; iron post stamped "1381 W"-----	1, 381. 480

Mosinee northwest along highways to northwest corner of sec. 24, T. 28 N., R. 5 E., thence west to Cherokee, thence north to point about 3 miles southwest of Milan.

T. 28 N., R. 6 E., southwest corner of sec. 19, at corner of fence; iron post stamped "1412 W"-----	1, 412. 143
T. 28 N., R. 5 E., 930 feet east of northwest corner of sec. 24, south side of road; iron post stamped "1404 W"-----	1, 403. 727
T. 28 N., R. 4 E., secs. 13-24, top of Chicago, Milwaukee & St. Paul Railway rail at Colby-Edgar road crossing-----	1, 294. 3
T. 28 N., R. 4 E., corner of secs. 15, 16, 21, and 22; top of corner stone-----	1, 321. 14
T. 28 N., R. 3 E., corner of secs. 14, 15, 22, and 23; top of corner stone-----	1, 328. 79
T. 28 N., R. 3 E., corner of secs. 17, 18, 19, and 20; top of corner stone-----	1, 325. 74
T. 28 N., R. 3 E., southwest corner of sec. 18, northeast corner of intersection of roads; iron post stamped "1281 W"-----	1, 280. 968
T. 28 N., R. 2 E., corner of secs. 2, 3, 10, and 11; top of corner stone-----	1, 345. 07
T. 29 N., R. 2 E., sec. 34, on top of Minneapolis, St. Paul & Sault Ste. Marie Railway rail at crossing-----	1, 339. 23

Merrill southwest along highways via Corning, Barney, Athens, and Corinth to point 3 miles southwest of Milan.

T. 31 N., R. 5 E., corner of secs. 15, 16, 21, and 22, on top of corner stone-----	1, 427. 72
T. 31 N., R. 5 E., corner of secs. 26, 27, 34, and 35; top of corner stone-----	1, 401. 22
T. 31 N., R. 5 E., northeast corner of SE $\frac{1}{4}$ sec. 34, at corner of fence; iron post stamped "1461 W"-----	1, 459. 305
T. 30 N., R. 5 E., northwest corner of sec. 33, 10 feet east of corner of church fence; iron post stamped "1398 W"-----	1, 398. 126
T. 30 N., R. 5 E., quarter corner of secs. 29 and 32; on top of stone-----	1, 310. 10
Athens, near sawmill, at crossing; top of Minneapolis, St. Paul & Sault Ste. Marie Railway rail-----	1, 333. 74
Athens, in front of Athens Hotel, sec. 31, T. 30 N., R. 4 E.; iron post stamped "1386 W"-----	1, 386. 223
T. 29 N., R. 4 E., corner of secs. 7, 8, 17, and 18; top of corner stone-----	1, 448. 91
T. 29 N., R. 3 E., corner of secs. 11, 12, 13, and 14, at intersection of roads; on top of nail in north end of culvert-----	1, 416. 78

## 46 SPIRIT LEVELING IN MICHIGAN AND WISCONSIN, 1897 TO 1909.

T. 29 N., R. 3 E., northwest corner of sec. 13, northwest corner of inter- section of roads, at corner of fence; iron post stamped "1417 W"-----	Feet. 1,417.266
T. 29 N., R. 3 E., near corner of secs. 9, 10, 15, and 16, top of Minne- apolis, St. Paul & Sault Ste. Marie Railway rail-----	1,436.86

Wausau west along highway to T. 29 N., R. 4 E., thence south to Edgar.

T. 29 N., R. 5 E., 800 feet east of northwest corner of NE. $\frac{1}{4}$ sec. 25; iron post stamped "1381 W"-----	1,380.851
Rib Falls, southwest corner of sec. 22, T. 29 N., R. 5 E., on top of rivet in southwest slope (bed) plate of bridge over Rib River-----	1,234.87
T. 28 N., R. 4 E., secs. 1 and 12, on bolt in southeast corner of bridge--	1,291.90
Edgar, sec. 25, T. 28 N., R. 4 E., on top of Chicago, Milwaukee & St. Paul Railway rail at crossing-----	1,246.6

Point 2 miles south of Corning south along highways to southeast corner of  
sec. 24, T. 29 N., R. 5 E.

T. 30 N., R. 6 E., secs. 18 and 19, and T. 30 N., R. 5 E., secs. 13 and 24, top of corner stone-----	1,291.72
T. 30 N., R. 6 E., secs. 19 and 30, and T. 31 N., R. 5 E., secs. 24 and 25, top of corner stone-----	1,271.80
Ziegler post office, T. 30 N., R. 6 E., northwest corner of sec. 31, at southwest corner of blacksmith shop; iron post marked "1276 W"-----	1,275.758

Athens northwest along highways to point near quarter corner on north side  
of sec. 4, T. 30 N., R. 3 E. (spur line).

T. 30 N., R. 3 E., southeast corner of sec. 27, at corner of rail fence, north of north end of culvert, at intersection of roads; iron post stamped "1437 W"-----	1,436.486
T. 31 N., R. 2 E., southeast corner of sec. 36, 20 feet west of center of road, 150 feet east of culvert; iron post stamped "1459 W"-----	1,459.022

### Baraboo, Crossplains, and Mazomanie Quadrangles.

#### DANE, IOWA, AND SAUK COUNTIES.

The elevations in the following list were determined by primary leveling extended from Portage, Wis., Dubuque, Iowa, and Milwaukee, Wis.

The leveling was done in 1905 by H. Bücher.

#### CROSSPLAINS QUADRANGLE.

Waunakee west along highways to Mazomanie.

T. 8 N., R. 7 E., 0.2 mile east by 0.1 mile south of northwest corner of sec. 9, 110 feet west of center of junction of roads, on south side of road, 20 feet east of telephone pole; iron post stamped "887 ADJ 1903"-----	Feet. 886.694
T. 8 N., R. 6 E., 0.3 mile north of southwest corner of sec. 12, south side of road, 27 feet west of fence corner at southwest corner of junction; iron post stamped "828 ADJ 1903"-----	827.574
T. 8 N., R. 6 E., 0.2 mile west of center of sec. 2, at junction of roads, east side of Chicago, Milwaukee & St. Paul Railway track, 100 feet north of telegraph guy pole; iron post stamped "750 ADJ 1903"-----	758.920

**Masomanie northeast to sec. 18, T. 9 N., R. 7 E.**

T. 9 N., R. 7 E., 0.1 mile north of southwest corner of sec. 18, north side of public road, 400 feet east of Chicago, Milwaukee & St. Paul Railway track, 1 foot south of fence; iron post stamped "Prim. Trav. Sta. No. 11, 751 ADJ 1903"-----	Feet. 751.000
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**Mount Horeb east along railroad and highway to sec. 32, T. 7 N., R. 9 E.**

Mount Horeb, fence corner north of creamery on west side of road, 6.5 feet west of road and 2.5 feet south of fence; iron post stamped "Prim. Trav. Sta. No. 9, 1223 ADJ 1903"-----	1,223.368
Klevenville, 1.3 miles west of, on east side of north-south road, at crossing, 16 feet south of track; iron post stamped "1049 ADJ 1903"-----	1,048.879
T. 7 N., R. 6 E., 0.2 mile east of southwest corner of sec. 27, on north side of crossroads at northeast corner of crossroads, 16 feet east of west fence line; iron post stamped "985 ADJ 1903"-----	985.334
T. 7 N., R. 6 E., 0.2 mile south by 0.2 mile east of northwest corner of sec. 36, at junction of roads, northeast corner, 24 feet north of fence corner; iron post stamped "1011 ADJ 1903"-----	1,011.344
T. 7 N., R. 8 E., 0.2-mile west of southeast corner of sec. 32, at northwest corner of junction of roads; iron post stamped "1073 ADJ 1903"-----	1,073.473
T. 7 N., R. 8 E., 0.3 mile west of southeast corner of sec. 35, northwest corner of junction of roads; iron post stamped "1051 ADJ 1903"-----	1,050.837

**MAZOMANIE QUADRANGLE.****Blackhawk along highway south to sec. 5, T. 8 N., R. 5 E., thence west to Spring Green.**

T. 9 N., R. 5 E., 0.1 mile south by 0.2 mile east of northwest corner of sec. 29, opposite center of junction of north-south road with road to southeast, on west side of road, 7 feet south of telephone pole; iron post stamped "973 ADJ 1903"-----	973.065
T. 8 N., R. 5 E., 0.2 mile east by 0.3 mile south of northwest corner of sec. 5, on east side of road, 43 feet north of fence corner at northeast corner of junction of roads; iron post stamped "736 ADJ 1903"-----	735.518
T. 8 N., R. 4 W., 0.1 mile east by 0.2 mile south of northwest corner of sec. 2, northwest corner of junction of roads, west of road, 30 feet north of fence corner; iron post stamped "728 ADJ 1903"-----	728.280

**Sec. 17, T. 7 N., R. 4 E., along highway southeasterly to Barneveld, thence along railroad east to Mount Horeb.**

T. 7 N., R. 4 E., 0.1 mile north by 0.1 mile west of southeast corner of sec. 14, on north side of road at junction; iron post stamped "771 ADJ 1903"-----	771.003
T. 7 N., R. 5 E., 0.2 mile north of south quarter corner of sec. 19, in north side of road, 90 feet west of center of junction; iron post stamped "810 ADJ 1903"-----	810.374
T. 7 N., R. 5 E., SW. $\frac{1}{4}$ sec. 32, at junction of east-west road, with road to north, on south side of road opposite center of junction; iron post stamped "887 ADJ 1903"-----	887.115

# 48 SPIRIT LEVELING IN MICHIGAN AND WISCONSIN, 1897 TO 1909.

Barneveld, 0.8 mile east of, east side of public road 90 feet south of point where east cattle guard leaves track at southeast corner of crossing; iron post stamped "1252 ADJ 1903"-----	Feet. 1,252.475
Blue Mounds, 0.1 mile west of station, road crossing, 60 feet south of track; iron post stamped "1301 ADJ 1903"-----	1,301.507
Mount Horeb, 2.3 miles west of station, 0.2 mile north by 0.2 mile east of southeast corner of sec. 9, T. 6 N., R. 6 E.; iron post stamped "1260 ADJ 1903"-----	1,260.243

Lodi along highway southwest to T. 9 N., R. 5 E., thence northwest to Blackhawk.

T. 9 N., R. 5 E., northwest corner of sec. 24, at junction of east-west road with road to south, on north side of road opposite junction, 4.2 feet east of fence corner; iron post stamped "893 ADJ 1903"---	892.757
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Blue Mounds north to sec. 29, T. 7 N., R. 6 E. (mean of direct and reverse lines).

T. 7 N., R. 6 E., SE. $\frac{1}{4}$ sec. 29, on east side of road at crossroads, opposite road to west and south of road to east, 15 feet east of oak; iron post stamped "1114 ADJ 1903"-----	1,114.050
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## BARABOO QUADRANGLE.

Sec. 18, T. 9 N., R. 7 E., northwest across Wisconsin River, thence west to Lodi.

T. 9 N., R. 6 E., at northwest corner of sec. 13, at northeast corner of crossroads, 8 feet north of fence corner; iron post stamped "762 ADJ 1903"-----	762.146
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## At Baraboo.

Baraboo, in front of Chicago & Northwestern Railway station; top of rail-----	863.8
Baraboo, in northeast corner of courthouse; bronze tablet stamped "890 B" (destroyed in 1904 in destruction of building)-----	892.981

## Denzer, Lavalley, and The Dells Quadrangles.

## ADAMS, JUNEAU, AND SAUK COUNTIES.

The elevations in the following list were determined by primary leveling extended from Portage, Wis., and Dubuque, Iowa.

The leveling was done in 1898-99 by D. C. Wray.

The standard bench marks are stamped with the letter "B" in addition to the figures of elevation, which, as they are stamped, are nearly all 3 feet too low.

## DENZER QUADRANGLE.

Leland north along highways and east along Chicago & Northwestern Railway via North Freedom to Baraboo.

Leland, near quarter corner on north side of sec. 19, T. 10 N., R. 5 E.; iron post stamped "787 B"-----	Feet. 790.089
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T. 11 N., R. 4 E., SE. $\frac{1}{4}$ sec. 14, near stone church; iron post stamped "1261 B"-----	Feet. 1, 264. 527
North Freedom, T. 11 N., R. 5 E., near center of sec. 2, 100 feet north of railroad track; iron post stamped "886 B"-----	889. 141
North Freedom south along highways via Denzer and Witwen to Lodi Mill.	
Denzer, T. 10 N., R. 5 E., near center of sec. 15, crossroads; iron post stamped "803 B"-----	806. 476
Lodi Mill, 200 feet south of, NW. $\frac{1}{4}$ sec. 16, T. 9 N., R. 6 E.; iron post stamped "734 B"-----	737. 565
Leland south and east via Anderson's cheese factory to Blackhawk.	
T. 9 N., R. 4 E., quarter corner on north side of sec. 11, west side of road, 200 feet northeast of Anderson's cheese factory; iron post stamped "815 B"-----	817. 955
Blackhawk, in sec. 8, T. 9 N., R. 5 E.; iron post stamped "772 B"----	774. 883
Lodi Mill north along highways to Lyons.	
T. 10 N., R. 6 E., quarter corner on south side of sec. 9; iron post stamped "846 B"-----	848. 847
T. 11 N., R. 6 E., northwest corner of sec. 27; iron post stamped "1200 B"-----	1, 202. 973

## THE DELLS QUADRANGLE.

Reedsburg north along highways via Lyndon to southwest corner of sec. 36, T. 15 N., R. 5 E., thence south and east to starting point.

T. 13 N., R. 4 E., NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 23, 150 feet north of east-west road, opposite Winfield creamery; iron post stamped "948 B"-----	951. 109
T. 14 N., R. 4 E., E. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 23, in northeast corner of schoolhouse yard; iron post stamped "1039 B"-----	1, 042. 187
T. 15 N., R. 5 E., in southwest corner of sec. 36, in northwest corner of schoolhouse yard; iron post stamped "857 B"-----	860. 483
T. 14 N., R. 5 E., quarter corner between secs. 34 and 35, 400 feet southeast of church, 600 feet northwest of red tavern; iron post stamped "043 B"-----	945. 986
T. 13 N., R. 5 E., 660 feet west of center of sec. 27, in southwest corner of schoolhouse yard, in southwest corner of cemetery; iron post stamped "887 B"-----	890. 500
T. 12 N., R. 5 E., 0.25 mile west of center of sec. 10, northeast of crossroads; iron post stamped "946 B"-----	949. 671
Reedsburg, 2 miles east, T. 12 N., R. 4 E., northeast corner of NW. $\frac{1}{4}$ sec. 12, southwest of road crossing; iron post stamped "938 B"-----	940. 899
Quarter corner between secs. 34 and 35, T. 14 N., R. 5 E., east and north via Kilbourn to northwest corner sec. 32, T. 15 N., R. 6 E.	
Kilbourn, in west side of northwest corner of schoolhouse foundation; iron post stamped "903 B"-----	906. 045
T. 14 N., R. 6 E., SE. $\frac{1}{4}$ sec. 28, in northeast corner of schoolyard, west side of river road; iron post stamped "924 B"-----	927. 107
T. 15 N., R. 6 E., in northwest corner of sec. 32, in northwest corner of schoolhouse yard; iron post stamped "904 B"-----	907. 686



## LAVALLE QUADRANGLE.

Point 0.25 mile north of center of sec. 34, T. 15 N., R. 4 E.

T. 15 N., R. 4 E., 0.25 mile north of center of sec. 34, in southeast corner of schoolhouse yard; iron post stamped "897 B"-----	Feet. 900.001
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Elkader, Lancaster, Mineral Point, Richland Center, and Waukon Quadrangles.

## GRANT, IOWA, LAFAYETTE, RICHLAND, AND SAUK COUNTIES.

The elevations in the following list were determined by primary leveling, which, together with work on adjacent quadrangles, forms a belt extending from Milwaukee to the Mississippi River, adjusted and in agreement at these points and at Portage with the 1907 adjustment elevation of bench marks of the United States Army Engineers. For additional elevations in the Elkader, Lancaster, and Waukon quadrangles see Iowa lists.

The leveling was done in the Lancaster quadrangle in 1897 by C. E. Hewitt; in the Mineral Point quadrangle in 1897 by Hewitt and in 1900 by G. Stubblefield; in the Elkader quadrangle in 1898 by C. B. Zorn; in the Richland Center quadrangle in 1901 by C. B. Zorn, in 1901-2-3 by M. A. Steele, and in 1905 by Henry Bucher; and in the Waukon quadrangle in 1900 by T. Burns.

Elevations as stamped are, as a rule, 1 foot too low. Many elevations in the Lancaster quadrangle are stamped about 11 feet too low.

## WAUKON QUADRANGLE.

Victory east and south along highway to Freeman, thence west to Desota.

T. 12 N., R. 7 W., sec. 34 (fourth prime meridian), 50 feet northeast of fifth post west of the fence corner west of Meddic's house, north of road; iron post stamped "853 DUBQ"-----	Feet. 854.813
T. 12 N., R. 6 W., near east-west quarter line of sec. 29, just north of forks of road, north of schoolhouse No. 1, in yard; iron post stamped "1165 DUBQ"-----	1,166.966
T. 11 N., R. 6 W., 0.25 mile north of center of sec. 14, 10 feet north of north gate post in front of house on east side of road; iron post stamped "1107 DUBQ"-----	1,108.241

Freeman southwest along highway to Ferryville.

T. 10 N., R. 6 W., southwest of center of sec. 10, 20 feet north of first post south of small gate in front of O. H. Olson's house, in side of fence; iron post stamped "696 DUBQ"-----	697.328
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Prairie du Chien east and north along highway to Eastman, thence west to river.

T. 7 N., R. 6 W., SW. $\frac{1}{4}$ of sec. 22, road junction commonly called "White Corner," 10 feet north of guide post at northwest corner of; iron post stamped "1211 DUBQ"-----	1,212.620
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Eastman, SW.  $\frac{1}{4}$  of sec. 18, T. 8 N., R. 5 W., about 800 feet north of building of F. H. Harvats & Co., blacksmiths and wagon makers, in southwest corner of schoolhouse yard; iron post stamped "1216 DUBQ"----- Feet.  
1, 217. 354

**Eastman north to Lynxville.**

Lynxville, sec. 23, T. 9 N., R. 6 W., in southwest corner of northeast schoolhouse yard; iron post stamped "681 DUBQ"----- 682. 933

**ELKADER QUADRANGLE.**

**Bradville south along highways to southwest corner of sec. 2, T. 3 N., R. 6 W.**

Bradville, 0.1 mile east of center of sec. 35, T. 6 N., R. 6 W., at crossroads; iron post stamped "1105"----- 1, 105. 625  
T. 5 N., R. 6 W., quarter corner on south side of sec. 16, 40 yards north of, 375 feet south of crossroads; iron post stamped "641"--- 641. 136  
T. 4 N., R. 6 W., southwest corner of sec. 24, at junction of roads; iron post stamped "1000"----- 1, 010. 750  
T. 3 N., R. 6 W., southwest corner of sec. 2, in southwest corner of school yard; iron post stamped "634"----- 636. 150

**LANCASTER QUADRANGLE.**

**Lancaster Junction south along Chicago & Northwestern Railway to Lancaster, thence south along highways to Potosi Station.**

Lancaster Junction, sec. 21, T. 6 N., R. 2 W., 50 feet south of switch; iron post stamped "1166 DBQ"----- 1, 177. 275  
Stitzer, sec. 9, T. 5 N., R. 2 W., southeast corner of block opposite station, in foundation of store; bronze tablet stamped "1166 DBQ"----- 1, 177. 712  
T. 5 N., R. 3 W., NW.  $\frac{1}{4}$  sec. 36, crossing of north-south wagon road and railroad, end of right of way fence; iron post stamped "1133 DBQ"----- 1, 144. 649  
T. 4 N., R. 3 W., near northwest corner of sec. 14; west end of south abutment of bridge over Pigeon Creek; bronze tablet stamped "946 DBQ"----- 956. 867  
T. 3 N., R. 3 W., SW.  $\frac{1}{4}$  sec. 26, northeast of Potosi; iron post stamped "986 DBQ"----- 997. 354  
Potosi station, sec. 4, T. 2 N., R. 3 W., 400 feet south of brewery, west side of road; iron post stamped "635 DBQ"----- 645. 842

**Fairplay north along highways to quarter corner on east side of sec. 12, T. 3 N., R. 2 W., thence east to Platteville.**

Fairplay, NW.  $\frac{1}{4}$  sec. 25, T. 1 N., R. 2 W., 50 feet southeast of bridge at east edge of town; iron post stamped "862 DBQ"----- 863. 212  
Dickeyville, SW.  $\frac{1}{4}$  sec. 22, T. 2 N., R. 2 W., in foundation stone of southwest corner of hotel; bronze tablet stamped "955 DBQ"--- 956. 726  
T. 3 N., R. 2 W., quarter corner on east side of sec. 11, southwest corner of T roads; iron post stamped "1014 DBQ"----- 1, 014. 892

**Platteville north along highways to Preston.**

T. 4 N., R. 1 W., SW.  $\frac{1}{4}$  sec. 8, crossroads at Bailey's creamery; iron post stamped "1090 DBQ"----- 1, 100. 710

## 52 SPIRIT LEVELING IN MICHIGAN AND WISCONSIN, 1897 TO 1909.

Annaton, sec. 18, T. 5 N., R. 1 W., bridge over Big Platte, in stone east end of north abutment; bronze tablet stamped "859 DBQ"-----	Feet. 870.057
T. 6 N., R. 1 W., sec. 10, 0.8 mile east of Preston, near center of road crossing; iron post stamped "1128 DBQ"-----	1, 130.26

### Point northeast of Potosi Station northwest along highways to Beetown.

T. 3 N., R. 4 W., SE. $\frac{1}{4}$ sec. 10, north side of wagon road; iron post stamped "980 DBQ"-----	991.816
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### Cassville north and east along highways via Beetown, Bloomington, and Mount Hope to Lancaster Junction.

T. 3 N., R. 5 W., near northwest corner of sec. 15; iron post stamped "967 DBQ"-----	978.769
Beetown, sec. 30, T. 4 N., R. 4 W., in northwest corner of foundation to post-office building; bronze tablet stamped "793 DBQ"-----	804.510
T. 4 N., R. 5 W., near quarter corner on south side of sec. 14, 2 miles east of North Andover, in north end of east abutment of bridge; bronze tablet stamped "873 DBQ"-----	884.764
Bloomington, sec. 26, T. 5 N., R. 5 W., east side of foundation of building opposite Bloomington Hotel; bronze tablet stamped "901 DBQ"-----	912.825
T. 5 N., R. 4 W., near quarter corner on west side of sec. 16; iron post stamped "1002 DBQ"-----	1, 103.945
Mount Hope, center of sec. 28, T. 6 N., R. 4 W., in east side of foundation of post-office building; bronze tablet stamped "1076 DBQ"-----	1, 037.738
T. 6 N., R. 3 W., sec. 29, Mount Ida cheese factory, in east end of foundation; bronze tablet stamped "1200 DBQ"-----	1, 211.485

### Lancaster southeast along highways to Platteville.

Ellenboro, near center of sec. 33, T. 4 N., R. 2 W., south end of west abutment of bridge over Big Platte River; bronze tablet stamped "712 DBQ"-----	723.648
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### At point 4 miles west of Mount Hope.

T. 6 N., R. 5 W., sec. 26, quarter corner on south side of; iron post stamped "1137 DBQ"-----	1, 148.366
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## MINERAL POINT QUADRANGLE.

### Platteville southeast along highways via Shullsburg to Gratiot.

Platteville, sec. 15, T. 3 N., R. 1 W., northwest corner of city hall, in stone foundation; bronze tablet stamped "992 DBQ"-----	993.175
T. 2 N., R. 2 E., northeast corner of sec. 29, 46.5 feet east by 36 feet north of northeast corner of O'Brien schoolhouse, in yard; iron post stamped "1082 DUBQ"-----	1, 083.596
Shullsburg, about 60 feet west by 102 feet north of northwest corner of high school, in yard; iron post stamped "1019 DUBQ"-----	1, 020.213
T. 1 N., R. 3 E., at northwest corner of sec. 11, 2 feet west by 6 feet south of northwest corner of churchyard; iron post stamped "988 DUBQ"-----	989.370
Gratiot post office, about 0.25 mile west of, about 312 feet west by 556 feet south of quarter corner north side of sec. 9, T. 1 N., R. 4 E., on north side of road; iron post stamped "796 DUBQ"-----	797.148

**Gratiot north along Chicago, Milwaukee & St. Paul Railway and highways to Mineral Point.**

Red Rock, 0.25 mile south by 60 rods west of center of sec. 17, T. 2 N., R. 4 E., 1.2 feet north by 4.5 feet south of southeast fence corner formed by intersection of east-west road with track of Chicago, Milwaukee & St. Paul Railway; iron post stamped "814 DUBQ"-----	Feet. 815.263
Darlington, 195.7 feet north of northeast corner of courthouse; iron post stamped "866 DUBQ"-----	867.335
T. 3 N., R. 3 E., 0.25 mile east of center of sec. 23, 1.6 feet west by 11.5 feet north of southwest fence corner at schoolhouse yard; iron post stamped "1026 DUBQ"-----	1,027.293
Fayette, 334 feet south of northwest corner of sec. 9, T. 3 N., R. 4 E., 4.7 feet north by 0.7 foot west of northeast fence corner at cross-roads; iron post stamped "1042 DUBQ"-----	1,043.341
T. 4 N., R. 4 E., 0.25 mile south of northeast corner of sec. 30, 1.2 feet north by 13.2 feet west of west fence corner, at junction of road south with east-west road; iron post stamped "1106 DUBQ"-----	1,107.382
T. 4 N., R. 3 E., 0.25 mile west of northeast corner of sec. 21, 0.6 foot east by 15.6 feet south of south fence corner formed by junction of road with north-south roads; iron post stamped "1065 DUBQ"-----	1,066.125
Mineral Point, 34 feet west of water tower, 1.7 feet east by 16.6 feet north of southwest corner of park; iron post stamped "1134 DUBQ"-----	1,135.308

**Mineral Point north along highways to Edmund, thence east via Dodgeville to quarter corner on north side of sec. 29, T. 6 N., R. 4 E., thence southwest to starting point.**

T. 5 N., R. 2 E., 0.25 mile west of northeast corner of sec. 16, 1 mile east of Linden, 1.4 feet north by 7.3 feet east of south fence corner formed by junction of east road with north-south road; iron post stamped "1128 DUBQ"-----	1,129.230
T. 6 N., R. 2 E., quarter corner on west side of sec. 27, 0.8 mile east of Edmund, 2 feet north by 16.6 feet east of east fence corner formed by junction of road south with east-west road; iron post stamped "1189 DUBQ"-----	1,190.245
Dodgeville, 10.3 feet north by 8.7 feet east of northeast corner of courthouse; iron post stamped "1220 DUBQ"-----	1,221.268
T. 6 N., R. 4 E., quarter corner on north side of sec. 32, 2 feet west by 4.2 feet south of southeast fence corner formed by intersection of north-south road and east-west road; iron post stamped "1199 DUBQ"-----	1,200.364
T. 5 N., R. 4 E., 0.25 mile east of center of sec. 18, 3.5 feet north by 1 foot west of corner of railroad fence, north of crossing and north-east of railroad; iron post stamped "947 DUBQ"-----	948.313

**Belmont south along highways to Benton.**

Belmont, 0.5 mile west of, quarter corner on east side of sec. 15, T. 3 N., R. 1 E., 1 foot north of west fence corner formed by junction of road south and east-west road; iron post stamped "1113 DUBQ"-----	1,114.231
T. 2 N., R. 1 E., near quarter corner on east side of sec. 16, 1.5 feet north by 0.5 feet west of southeast corner of schoolhouse yard; iron post stamped "973 DUBQ"-----	974.122
Benton, 22 feet north by 24 feet east of northeast corner of schoolhouse; iron post stamped "921 DUBQ"-----	922.178

**Belmont north along highways to Montford.**

Rewey, 2.4 feet south by 11.2 feet west of northeast corner of public schoolhouse yard; iron post stamped "1129 DUBQ"-----	Feet. 1, 130. 170
T. 5 N., R. 1 E., 0.25 mile east of southwest corner of sec. 17, about 1.5 feet north by 7.8 feet west of southeast corner of schoolhouse yard; iron post stamped "1094 DUBQ"-----	1, 095. 114
T. 6 N., R. 1 E., center of sec. 29, 3.4 feet east by 3.8 feet south of northwest corner of schoolhouse yard, at junction of north and south with east-west roads; iron post stamped "1201 DUBQ"-----	1, 202. 124

**Belmont northeast along highways to Mineral Point.**

T. 3 N., R. 2 E., quarter corner on east side of sec. 15, 1 mile north of Truman, 14 feet east by 15 feet south of north fence corner formed by junction of east-west road and road from south; iron post stamped "1056 DUBQ"-----	1, 057. 283
T. 4 N., R. 2 E., 0.4 mile west by 300 feet south of center of sec. 11, at crossroads, 3.5 feet south by 2.7 feet east of northwest corner of schoolhouse yard; iron post stamped "1101 DUBQ"-----	1, 102. 199

**Fairplay northeast along highways via Lewisburg and Georgetown to Platteville.**

T. 1 N., R. 1 W., quarter corner on north side of sec. 21, corner of Val Wietterholt's field; iron post stamped "DBQ 913"-----	913. 744
Georgetown, sec. 27, T. 2 N., R. 1 W., northwest corner of Georgetown Hall, in foundation stone; bronze tablet stamped "994 DBQ"-----	995. 632

**RICHLAND CENTER QUADRANGLE.**

Dodgeville along highways north to Lato, thence west via Vine Knob to sec. 15,  
T. 7 N., R. 1 E., thence south to point near Cobb.

Dodgeville, 10.3 feet north by 8.7 feet east of northeast corner of courthouse; iron post stamped "1220 DBQ"-----	1, 221. 263
T. 7 N., R. 2 E., 0.25 mile west of northeast corner of sec. 16, southwest corner of intersection of east-west road with north-south road; iron post stamped "739 DBQ"-----	739. 318
Highland, in schoolhouse yard, 7 feet east of front wall of lot, on north side of walk; iron post stamped "1182 DBQ"-----	1, 181. 627
T. 6 N., R. 1 E., in northwest corner of schoolhouse yard, sec. 29; iron post stamped "1201 DBQ"-----	1, 202. 124

Lato north to sec. 28, T. 8 N., R. 3 E., thence west to center of sec. 25, T. 8 N.,  
R. 2 E.

T. 7 N., R. 3 E., NE. $\frac{1}{4}$ sec. 8, in southwest corner of schoolhouse yard; iron post stamped "799 DBQ"-----	798. 847
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Sec. 15, T. 7 N., R. 1 E., north along highway to Muscoda, thence east via  
Avoca to Lone Rock, thence south to center of sec. 25, T. 8 N., R. 2 E.

Muscoda, in front of station; top of rail-----	693
Avoca, in front of station; top of rail-----	698
Avoca, Wisconsin House, 18 inches north and in line with northeast corner of; iron post stamped "699 DBQ"-----	698. 690

Lone Rock, south of station, blacksmith shop, northwest corner, 2 feet east by 2 feet north; iron post stamped "705 DBQ"-----	704.775
T. 8 N., R. 2 E., sec. 25, at northwest corner of bridge over Otter Creek, northeast corner of stone abutment; point-----	709.16

Sec. 28, T. 8 N., R. 3 E., along highway north, thence east to Hillside schoolhouse, 0.25 mile east of northwest corner of sec. 31, T. 8 N., R. 4 E., thence south to Barnveld, thence southwest to sec. 27, T. 6 N., R. 3 E.

T. 8 N., R. 3 E., 0.5 mile west of center of sec. 22, intersection of roads, southeast corner of, 4 feet south of fence post; iron post stamped "706 DBQ"-----	706.537
T. 8 N., R. 4 E., 0.5 mile north of center of sec. 31, northwest corner of Unity Chapel yard; iron post stamped "728 DBQ"-----	727.948
T. 7 N., R. 4 E., 3 feet west of corner stone at southeast corner of sec. 17; iron post stamped "1062 DBQ"-----	1,062.141

Lone Rock northwest along highway via Twin Bluffs to Richland Center, thence north along highway to Buck Creek post office, thence east via Lloyd and Logansville to Denzer quadrangle.

T. 9 N., R. 2 E., NW. $\frac{1}{4}$ sec. 26, southeast corner of house lot on west side of road, 400 feet north of turn of road; iron post stamped "720 DBQ"-----	719.387
Twin Bluffs, in front of Chicago, Milwaukee & St. Paul Railway station; top of rail-----	703.4
Twin Bluffs, sec. 12, T. 9 N., R. 1 E., on east side of road opposite road from west; iron post stamped "707 DBQ"-----	706.730
Richland Center, sec. 22, T. 10 N., R. 1 E., on window sill of courthouse basement; aluminum tablet stamped "737 DBQ"-----	736.874
T. 11 N., R. 1 E., sec. 22, 0.25 mile east of Black Creek, in southeast corner of schoolhouse yard; iron post stamped "764 DBQ"-----	763.361
Lloyd, sec. 22, T. 11 N., R. 2 E., on east side of road, 150 feet south of crossroads; iron post stamped "810 DBQ"-----	809.927
T. 11 N., R. 3 E., in southeast corner of sec. 17, in southeast corner of schoolhouse yard; iron post stamped "1182 DBQ"-----	1,181.651

Logansville south and southwest, connecting near Plain with side lines west from Leland and from Blackhawk, thence southwest to Lone Rock.

T. 9 N., R. 4 E., sec. 5, east corner of two corners formed by intersection of roads at Plain; iron post stamped "800 DBQ"-----	799.334
T. 9 N., R. 3 E., southwest corner of sec. 23, at southwest corner of church lot; iron post stamped "772 DBQ"-----	771.156

Lloyd southwest 4 miles (direct and reverse line).

Neptune, sec. 4, T. 10 N., R. 4 E., in southwest corner of school yard; iron post stamped "752 DBQ"-----	752.048
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T. 10 N., R. 4 E., northwest to Loretta (direct and reverse line).

Loretta, sec. 14, T. 10 N., R. 3 E., opposite crossroad from church; iron post stamped "1156 DBQ"-----	1,164.047
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## 56 SPIRIT LEVELING IN MICHIGAN AND WISCONSIN, 1897 TO 1909.

Bench marks near Spring Green set in 1905 on circuit from Mazomanie quadrangle.

T. 8 N., R. 4 E., 0.25 mile west of, northeast corner of sec. 8, 1.3 feet north of fence, 6.5 feet west of fence corner, at southwest corner of crossroads; iron post stamped "727 ADJ 1903"-----	Feet. 726.677
T. 8 N., R. 4 E., near south quarter corner of sec. 7, on east side of village of Spring Green, road crossing of Chicago, Milwaukee & St. Paul Railway, on east side of public road, 26 feet north of track, 1.2 feet west of fence; iron post stamped "728 ADJ 1903"---	727.736
T. 8 N., R. 4 E., near south quarter corner of sec. 18, in field on east side of road, stone monument marking southeast end of base line for triangulation of Wisconsin, United States Coast and Geodetic Survey, on top of large square stone, point is center of upper loop of east figure 8, in chiseled date "1878"-----	716.88

### La Crosse and Sparta Quadrangles.

#### LA CROSSE AND MONROE COUNTIES.

The elevations in the following list were determined by primary leveling extended from a bench mark of the Mississippi River Commission at La Crosse.

The leveling was done in 1905 by H. Bücher.

#### LA CROSSE QUADRANGLE.

La Crosse to North La Crosse, thence along Chicago, Milwaukee & St. Paul Railway to Bangor (mean of direct and reverse lines).	
North La Crosse station, south abutment of Chicago, Burlington & Quincy Railroad overhead bridge, in north face of, 11.2 feet east of west end and 3 feet above ground; aluminum tablet stamped "649 ADJ 1903"-----	Feet. 649.234
North La Crosse, 3.4 miles east of, at northwest corner of bridge 514, in top of abutment; aluminum tablet stamped "659 ADJ 1903"-----	658.952
North La Crosse, 6.6 miles east, on Chicago & Northwestern Railway, at west corner of bridge 640, in top of abutment; aluminum tablet stamped "671 ADJ 1903"-----	671.023
West Salem, 1.1 miles west of, 100 feet west of overhead bridge, in top at northwest corner of concrete culvert; aluminum tablet stamped "706 ADJ 1903"-----	706.014
West Salem, 1.7 miles east of, in top at northwest corner of stone culvert 625, 3.4 feet east of west edge, 1.2 feet south of north edge; aluminum tablet stamped "763 ADJ 1903"-----	763.576

#### SPARTA QUADRANGLE.

Bangor along highways southeast to Portland, thence northeast to Melvina, thence north along railroad to Leon, thence north along highway to Sparta.

Bangor, northeast abutment of railroad bridge over Dutch Creek, in top of first course of masonry below coping; aluminum tablet stamped "740 ADJ 1903"-----	740.247
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T. 16 N., R. 5 W., SE. $\frac{1}{4}$ sec. 16, schoolhouse on northeast side of road, at southwest corner of school ground; iron post stamped "794 ADJ 1903"-----	Feet. 794.167
T. 16 N., R. 5 W., 0.2 mile east of southwest corner of sec. 26, junction of roads, southeast corner, on east side of road, 5 feet south of fence corner; iron post stamped "877 ADJ 1903"-----	877.022
T. 15 N., R. 5 W., 0.1 mile east by 0.2 mile south of northwest corner of sec. 12, junction of roads, on north side of road, 3.8 feet west of fence corner, 0.5 foot south of fence; iron post stamped "1,336 ADJ 1903"-----	1,336.162
T. 15 N., R. 4 W., 0.25 mile south by 0.25 mile east of northwest corner of sec. 8, at southeast corner of junction of roads, on south side of road, 3.5 feet east of fence corner, 1 foot north of fence; iron post stamped "1,340 ADJ 1903"-----	1,339.730
T. 15 N., R. 4 W., 0.2 mile east of south quarter corner of sec. 16, at southwest corner of Portland schoolhouse, at junction of roads, 2.5 feet north of corner, 1.5 feet west of wall; iron post stamped "1,312 ADJ 1903"-----	1,312.390
T. 15 N., R. 4 W., 0.3 mile west of southeast corner of sec. 12, crossing of Chicago, Milwaukee & St. Paul Railway (Viroqua branch), on south side of road in railroad right of way, 35 feet east of center of track, 1.6 feet north of cattle guard fence; iron post stamped "945 ADJ 1903"-----	945.185
Melvina station, at northeast corner of platform; top of rail-----	863.8
T. 16 N., R. 3 W., SW. $\frac{1}{4}$ sec. 32, on west side of wagon road, opposite signboard "station 1 mile," at southeast corner of Ray Richmond's yard; iron post stamped "863 ADJ 1903"-----	863.627
Leon station, at northeast corner of road crossing, in railroad right of way; iron post stamped "793 ADJ 1903"-----	793.100
T. 17 N., R. 3 W., 0.3 mile north of southwest corner of sec. 32, 70 feet north of junction of roads, on west side of road, 6 feet south of last of a north-and-south row of butternut trees; iron post stamped "879 ADJ 1903"-----	879.378
Sparta, bridge C-428, northeast of station, at south corner of top of concrete abutment; aluminum tablet stamped "790 ADJ 1903"-----	790.276
Sparta, Monroe County courthouse, at southeast corner of grounds of; iron post stamped "793.393 SPARTA B. M."-----	792.390
T. 17 N., R. 4 W., 0.2 mile south by 0.2 mile east of northwest corner of sec. 14, junction of road, on south side of road opposite junction, 8 feet east of fence corner; iron post stamped "811 ADJ 1903"-----	810.848
T. 17 N., R. 4 W., 0.2 mile west by 0.3 mile north of southeast corner of sec. 8, south of junction of roads, 80 feet from east side of road; iron post stamped "834 ADJ 1903"-----	834.683
T. 17 N., R. 4 W., 0.25 mile west of center of sec. 18, junction of roads, east of schoolhouse, on south side of road, 40 feet east of northwest corner of schoolhouse grounds; iron post stamped "795 ADJ 1903"-----	794.836
T. 17 N., R. 5 W., 0.2 mile south of north quarter corner of sec. 25, at southwest corner of junction of roads, in masonry foundation of north wall of schoolhouse; aluminum tablet stamped "787 ADJ 1903"-----	786.984
T. 17 N., R. 5 W., north quarter corner of sec. 33, junction of roads on west side of road, 12 feet north of fence corner, at northwest corner of junction; iron post stamped "778 ADJ 1903"-----	777.863



**Arkansaw, Chippewa Falls, Durand, Elkmound, and Wabasha Quadrangles.****BUFFALO, CHIPPEWA, DUNN, EAU CLAIRE, AND PEPIN COUNTIES.**

The elevations in the following list were determined by primary leveling extended from bench mark "Bottom" of the Mississippi River Commission, opposite Reeds, Minn., the elevation of which is accepted as 672.625 feet above mean sea level.

The leveling was done in 1903 by J. R. Ellis.

**WABASHA QUADRANGLE.**

**Reeds, Minn., northeast along Chicago, Milwaukee & St. Paul Railway to Maxwell.**

Reeds, Minn., opposite (Mississippi River Commission bench mark "Bottom"), tile and iron pipe in low, flat ground, 721.6 feet (220 meters) from left bank of river in property of Mrs. G. S. Richards, 147.6 feet (45 meters) west of Chicago, Milwaukee & St. Paul Railway trestle, 672.4 feet (205 meters) southwest of end of trestle, near small pond.....	Feet. 672.625
Trevin's, at grade crossing of Chicago, Burlington & Quincy Railroad and Chicago, Milwaukee & St. Paul Railway; top of rail.....	684.6
Maxwell, 180 feet southwest of platform, in sandstone post 8 by 12 by 30 inches, set 27 inches in ground; bronze tablet stamped "691 E. C.".....	691.466

**ARKANSAW QUADRANGLE.**

**Maxwell northeast along Chicago, Milwaukee & St. Paul Railway to Durand.**

T. 24 N., R. 13 W., 0.25 mile due west of center of sec. 6, just outside of Chicago, Milwaukee & St. Paul Railway right of way, left bank of river, in sandstone post 12 by 6 by 30 inches; bronze tablet stamped "733 E. C.".....	733.148
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**DURAND QUADRANGLE.**

**Durand northeast along Chicago, Milwaukee & St. Paul Railway to Meridian.**

Durand, county jail building, water table at southwest corner; bronze tablet stamped "724 E. C.".....	724.631
Red Cedar, 0.3 mile south of, quarter corner on north side of sec. 6, T. 25 N., R. 12 W., in ground at T road east, in sandstone post 6 by 12 by 30 inches; bronze tablet stamped "755 E. C.".....	755.940
Meridian, north part of sec. 14, T. 26 N., R. 12 W., at southeast corner of Iver Brock's residence, in stone foundation; bronze tablet stamped "740 E. C.".....	740.193

**ELK MOUND QUADRANGLE.**

**Meridian northeast along Chicago, Milwaukee & St. Paul Railway to Eau Claire.**

Caryville, east part of sec. 11, T. 26 N., R. 11 W., at northwest corner of post office, in stone foundation of Strand's general store; bronze tablet stamped "760 E. C.".....	760.414
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Coolles Lake, near outlet, at southwest corner of B. A. Churchville's residence, in foundation; bronze tablet stamped "779 E. C."-----	Feet. 779.626
Shawton, 1 mile south of, northeast corner of sec. 36, T. 27 N., R. 10 W., in stone foundation at northwest corner of Henry Trimble's residence; bronze tablet stamped "781 E. C."-----	781.11

**CHIPPEWA FALLS QUADRANGLE.****Eau Claire north along highway to Chippewa Falls.**

Eau Claire, southwest corner of courthouse; bronze tablet stamped "797 E. C."-----	797.743
Eau Claire, Chicago, Milwaukee & St. Paul and Chicago & Northwestern Railways, grade crossing; top of rail-----	880.5
Badger Mills, in lawn of summer hotel, 50 feet due west of front window, in sandstone post 10 by 8 by 30 inches; bronze tablet stamped "827 E. C."-----	827.986
Chippewa Falls, northeast corner of foundation of city building containing quarters of fire department and city jail; bronze tablet stamped "840 E. C."-----	840.738

**St. Croix Dalles Quadrangle.****POLK COUNTY.**

The elevations in the following list are based upon permanent bench mark 29-A of the United States Army Engineers' precise leveling at Wyoming Village, Minn., the accepted elevation of which is 892.119 feet above mean sea level. From this point elevations were carried by a double-rodged line of primary leveling to Taylors Falls. The leveling in Minnesota is given in Bulletin 453.

The leveling was done in 1897 by S. P. Connor.

The letters "T F" stamped upon the bench marks refer to Taylors Falls, Minn. Points marked with asterisk are on spur line.

**ST. CROIX DALLES QUADRANGLE.**

**St. Croix Falls north and east to northeast corner of sec. 1, T. 34 N., R. 18 W.; thence southwest along highways to St. Croix Falls.**

St. Croix Falls, Minneapolis, St. Paul, & Sault Ste. Marie Railway station in front of; top of rail-----	Feet. 922.7
St. Croix Falls, NW. $\frac{1}{4}$ sec. 30, T. 34 N., R. 18 W., southeast corner of Kentucky and Washington streets; iron post stamped "812 T F"-----	813.829
T. 35 N., R. 18. W., southwest corner of sec. 35; iron post stamped "1242 T F"-----	1,243.464
T. 34 N., R. 18 W., northeast corner of sec. 1; iron post stamped "1232 T F"-----	1,233.820

**St. Croix Falls along highways via Thaxter Lake, Poplar Lake, Bear Lake, Big Lake, Alden, and Farmington to Osceola.**

T. 34 N., R. 18 W., SW. $\frac{1}{4}$ sec. 30, on rock bluff across river from Taylors Falls boat landing between St. Croix River and Thaxter Lake; bronze tablet stamped "848 T F"-----	849.544
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# 60 SPIRIT LEVELING IN MICHIGAN AND WISCONSIN, 1897 TO 1909.

	Feet.
*Dresser Junction, in front of station; top of rail.....	955.2
*Dresser Junction postoffice, 75 feet west of, near southeast corner of sec. 7, T. 33 N., R. 18 W.; iron post stamped "969 T F".....	970.890
*T. 33 N., R. 17 W., quarter corner on north side of sec. 7; iron post stamped "1114 T F".....	1,115.763
*T. 32 N., R. 17 W., northwest corner of sec. 6; iron post stamped "1019 T F".....	1,020.755
Alden post office, T. 32 N., R. 18 W., SW. $\frac{1}{4}$ sec. 15; iron post stamped "953 T F".....	955.026
*East Farmington, SE. $\frac{1}{4}$ sec. 15, T. 32 N., R. 19 W., in front of town hall; iron post stamped "1038 T F".....	1,039.530
Osceola, southeast corner of county jail building, NW. $\frac{1}{4}$ sec. 27, T. 33 N., R. 19 W.; bronze tablet stamped "810 T F".....	811.906
Osceola, in front of station; top of rail.....	810

## Osceola east along highways to Nye.

Nye, in front of station; top of rail.....	968.8
Nye, SW. $\frac{1}{4}$ sec. 27, T. 33 N., R. 18 W.; iron post stamped "966 F F".....	967.477

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DEPARTMENT OF THE INTERIOR  
UNITED STATES GEOLOGICAL SURVEY

GEORGE OTIS SMITH, DIRECTOR

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**BULLETIN 462**

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RESULTS OF SPIRIT LEVELING  
IN OREGON

1896 TO 1910, INCLUSIVE

---

R. B. MARSHALL, CHIEF GEOGRAPHER

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WORK DONE IN COOPERATION WITH THE STATE  
FROM 1905 TO 1910, INCLUSIVE



WASHINGTON  
GOVERNMENT PRINTING OFFICE  
1911





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# RESULTS OF SPIRIT LEVELING IN OREGON, 1896 TO 1910, INCLUSIVE.

R. B. MARSHALL, Chief Geographer.

## INTRODUCTION.

*Scope of the work.*—All results of spirit leveling in the State of Oregon previously published by the United States Geological Survey and all the results of later work are included in this report, rearranged by quadrangles. All elevations are based on the precise level line of the Coast and Geodetic Survey from Seattle, Wash., to Huntington, Oreg., as adjusted by that Survey in 1905, and on the precise line of the United States Geological Survey between Portland, Oreg., and the California-Oregon State line.

*Personnel.*—The field work previous to 1903 was done under the general direction of R. U. Goode, geographer; that for 1903 to 1906, inclusive, under E. M. Douglas, geographer; that for 1907 under R. B. Marshall, geographer; and the later work under T. G. Gerdine, geographer, under the general direction of R. B. Marshall, chief geographer. The names of the various levelmen are given in the introduction to each list. The office work of computation, adjustment, and preparation of lists was done mainly by S. S. Gannett, geographer, and D. H. Baldwin, topographer, and since 1907 under the general direction of E. M. Douglas, geographer.

*Classification.*—The elevations are classified as precise or primary, according to the methods employed in their determination. For precise lines instruments and rods of the highest grade known are used; each line is run both forward and backward, and every precaution taken to guard against error. The allowable divergence between the forward and backward lines in feet is represented by the formula  $0.017 \sqrt{D}$ , in which  $D$  is the distance in miles between bench marks. For primary lines standard Y levels are used; lines are run in circuits or are closed on precise lines, with an allowable closing error in feet of  $0.05 \sqrt{D}$ , in which formula  $D$  equals the length of the circuit in miles, sufficient care being given the work to maintain this standard. For levels of both classes careful office adjustments are made, the small outstanding errors being distributed over the lines.

*Bench marks.*—The standard bench marks are of two forms. The first form is a circular bronze or aluminum tablet (*C* and *E*, Pl. I), 3.5 inches in diameter and 0.25 inch thick, having a 3-inch stem, which is cemented in a drill hole in solid rock, in the wall of some public building, bridge abutment, or other substantial masonry structure. The second form (*F*, Pl. I), which is set in the ground where no masonry or rock is available, consists of a hollow wrought-iron post 3½ inches in outside diameter and 4 feet long. The bottom is spread out to a width of 10 inches in order to give a firm bearing on the earth. A bronze or aluminum-bronze cap is riveted over the top of the post. A third style of bench mark with abbreviated lettering (*B* and *D*, Pl. I) is used for unimportant points. This consists of a special copper nail 1½ inches in length driven through a copper washer ⅝ inch in diameter. The tablets, as well as the caps on the iron posts, are appropriately lettered, and where States have cooperated in the work the fact of such cooperation is indicated by the addition of the State name (at *G*, Pl. I). The numbers stamped on the bench marks described in the following pages are the elevations to the nearest foot as determined by the levelman. These numbers are stamped with ⅛-inch steel dies on the tablets or post caps to the left of the word "feet." The office adjustment of the notes and the reduction to mean sea level datum may so change some of the figures that the original markings are 1 or 2 feet in error. It is assumed that engineers and others who have occasion to use the bench-mark elevations will apply to the Director of the United States Geological Survey, at Washington, D. C., for their adjusted values, using the markings as identification numbers only.

*Datum.*—All Geological Survey elevations are referred to mean sea level, which is the level that the sea would assume if the influence of winds and tides were eliminated. This level is not the elevation determined from the mean of the highest and lowest tides, nor is it the half sum of the mean of all the high tides and the mean of all the low tides, which is called half-tide level. *Mean sea level is the average height of the water, all stages of the tide being considered.* It is determined from observations made by means of tidal gauges placed at stations where local conditions, such as long narrow bays, rivers, and like features will not affect the height of the water. To obtain even approximately correct results these observations must extend over at least one lunar month, and if great accuracy is desired they must extend over several years. At ocean stations the half-tide level and mean sea level usually differ but little. It is assumed that there is no difference between the mean sea level as determined from observations in the Atlantic Ocean, Gulf of Mexico, or the Pacific Ocean.



## GEOLOGICAL SURVEY BENCH MARKS.

*A*, Tablet used in cooperating States. The State name is inserted at *G*.  
*B* and *D*, Copper temporary bench mark, consisting of a nail and copper washer.  
*A*, *C*, and *E*, Tablets for stone or concrete structures.  
*F*, Iron post used where there is no rock.



The connection with tidal stations for bench marks in certain areas that lie at some distance from the seacoast is still uncertain, and this fact is indicated by the addition of a letter or a word to the right of the word "datum" on tablets or posts. For such areas corrections for published results will be made from time to time as the precise level lines of the Geological Survey or other Government organizations are extended.

*Topographic maps.*—Maps of the following quadrangles wholly or partly in Oregon have been published by the United States Geological Survey up to April 20, 1911. They may be obtained (except as noted) for 5 cents each or \$3 a hundred, on application to the Director of the Survey at Washington, D. C.

Ashland.  
 Baker City.  
 Blalock Island (Oreg.-Wash.).  
 Coos Bay.  
 Crater Lake National Park (with descriptive text on the back).  
 Grants Pass.  
 Eugene.  
 Ironside Mountain.  
 Klamath.  
 Mitchell Butte (Oreg.-Idaho).  
 Nampa (Idaho-Oreg.).  
 Portland (Oreg.-Wash.).  
 Port Orford.  
 Riddles.  
 Roseburg.  
 Sumpter.  
 Telocaset.  
 Umatilla (Oreg.-Wash.).  
 Weiser (Idaho-Oreg.).  
 Willamette Valley, sheets 1, 2, and 3, comprising portions of Eugene 15' quadrangle (40 cents each).

#### PRECISE LEVELING.

**Albany, Ashland, Dothan, Drain, Eugene, Grants Pass, Halsey, Oregon City, Portland, Riddles, Roseburg, Salem, and Shelburn Quadrangles.**

**CLACKAMAS, DOUGLAS, JACKSON, JOSEPHINE, LANE, LINN, MARION, AND MULTNOMAH COUNTIES.**

The elevations in the following list are the results of a double simultaneous precise level line run by C. H. Semper, from Benicia, Cal., in 1902, and extended through Oregon in 1903, along the Southern Pacific Railroad to Portland. The elevation accepted at Portland is that determined by a double primary level line run in 1898 by J. H. Carlock from Coast and Geodetic Survey bench marks at Astoria. A Buff & Berger precise level and two double-faced non-extensible target rods were used.



## ASHLAND 1' QUADRANGLE.

California-Oregon State line to Portland, Oreg. (portion of line).

Cole, 1.5 miles north of, west side of railroad, 450 feet north of milepost 406, at telegraph pole; iron post stamped "2997 B 1903"-----	Feet. 2,998.027
Cole, 4.3 miles north of, east side of railroad, 150 feet south of milepost 409, at telegraph pole; iron post stamped "3445 B 1903"-----	3,445.739
Coleston, in front of station; top of rail-----	3,714.0
Coleston, 1.2 miles north of, east side of railroad, 150 feet north of milepost 412, at telegraph pole; iron post stamped "3922 B 1903"__	3,922.473
Siskiyou, in front of station; top of rail-----	4,113.8
Siskiyou, 1.1 miles north of, east side of railroad, 300 feet north of milepost 415, at telegraph pole; iron post stamped "3918 B 1903"__	3,919.351
Wall Creek flag station, 0.6 miles south of, 510 feet southeast of milepost 418, 20 feet east of east rail; iron post stamped "3486 B 1903"-----	3,487.464
Steinman, 360 feet south of station, 80 feet north of milepost 421, east side of railroad, at telegraph pole; iron post stamped "3036 B 1903"-----	3,037.341
Steinman, in front of station; top of rail-----	3,027.2
Steinman, 2.7 miles north of, east side of railroad, at fence line, 80 feet south of milepost 424; iron post stamped "2561 B 1903"-----	2,562.210
Steinman, 5.6 miles north of, west side of railroad, 100 feet north of milepost 427, at telegraph pole; iron post stamped "2180 B 1903"__	2,180.960
Ashland, 1,800 feet south of station, at Mountain Avenue crossing, 42 feet east of rail, south side of street; iron post stamped "1874 B 1903"-----	1,874.807
Ashland, in front of station; top of rail-----	1,868.8
Ashland, 2.5 miles north of, east side of railroad, 5 feet from milepost 433; iron post stamped "1755 B 1903"-----	1,756.159
Talent, in front of station; top of rail-----	1,635.2
Talent, northwest corner of station, 4 feet north of milepost 436, 11 feet east of rail; iron post stamped "1633 B 1903"-----	1,634.541
Phoenix, in front of station; top of rail-----	1,543.7
Phoenix, 0.8 mile north of, east side of railroad, fence line at second telegraph pole north of milepost 439; iron post stamped "1513 B 1903"-----	1,513.899
Medford, in front of station; top of rail-----	1,374.8
Medford, Nash Hotel, west face at entrance; aluminum tablet stamped "1376 B 1903"-----	1,377.097
Medford, 3.1 miles north of, highway crossing, 30 feet east of track, on south margin of highway; iron post stamped "1292 B 1903"__	1,293.144
Central Point, in front of station; top of rail-----	1,273.0
Central Point, 2 miles north of, T. 36 S., R. 2 W., near center of sec. 33, at highway crossing, 11 feet east of rail, south side of highway; iron post stamped "1214 B 1903"-----	1,215.414
Tolo, 4.8 miles north of Central Point, east side of railroad, 150 feet south of milepost 452, at telegraph pole; iron post stamped "1164 B 1903"-----	1,165.507

## GRANTS PASS 30' QUADRANGLE.

California-Oregon State line to Portland, Oreg. (portion of line).

Central Point, 7.9 miles north of, east side of railroad, 750 feet north of milepost 455, at telegraph pole; iron post stamped "1137 B 1903"	Feet. 1, 138. 284
Gold Hill, in front of station; top of rail	1, 084. 1
Gold Hill, 15 feet east of track, 24 feet north of station; iron post stamped "1084 B 1903"	1, 085. 056
Gold Hill, 2.4 miles north of, east side of railroad, 200 feet north of milepost 461, at telegraph pole; iron post stamped "1049 B 1903"	1, 050. 060
Gold Hill, 5.4 miles north of, east side of railroad, 3 feet south of milepost 464; iron post stamped "1018 B 1903"	1, 019. 419
Woodville, in front of station; top of rail	999. 7
Woodville, 0.7 mile north of, east side of railroad, 3 feet north of milepost 467; iron post stamped "993 B 1903"	994. 128
Woodville, 6.6 miles north of, east side of railroad, 5 feet north of milepost 473; iron post stamped "945 B 1903"	946. 287
Grants Pass, in front of station; top of rail	938. 0
Grants Pass, high school, west face, south corner; aluminum tablet stamped "956 B 1903"	956. 807
Grants Pass, 3.7 miles north of, east side of railroad, 10 feet from rail, 200 feet south of milepost 479; iron post stamped "1218 B 1903"	1, 218. 590
Grants Pass, 6.7 miles north of, 15 feet east of railroad, 25 feet south of highway, at milepost 482; iron post stamped "1050 B 1903"	1, 050. 935

## RIDDLES 30' QUADRANGLE.

California-Oregon State line to Portland, Oreg. (portion of line).

Merlin, in front of station; top of rail	910. 5
Merlin, 90 feet west of railroad, 50 feet north of Mitchell's store, at fence line; iron post stamped "900 B 1903"	900. 504
Merlin, 4.2 miles north of, at highway crossing, 15 feet east of track, 15 feet south of north margin of highway; iron post stamped "1252 B 1903"	1, 253. 177
Hugo, in front of station; top of rail	1, 290. 4
Hugo, 2.4 miles north of, west side of railroad, opposite milepost 491, 25 feet from rail; iron post stamped "1459 B 1903"	1, 459. 542
Tunnel 9, 1.7 miles north of, east side of railroad, 40 feet south of milepost 494, 18 feet east of track; iron post stamped "1330 B 1903"	1, 331. 445
Leland, in front of station; top of rail	1, 191. 6
Leland, 1.6 miles north of, east side of railroad, 5 feet north of milepost 497; iron post stamped "1098 B 1903"	1, 098. 668
Leland, 4.4 miles north of, east side of railroad, at first telegraph pole south of milepost 500, 20 feet east of track; iron post stamped "1150 B 1903"	1, 150. 878
Wolf Creek, 400 feet south of station, 40 feet east of track, near telegraph pole; iron post stamped "1289 B 1903"	1, 290. 364
Wolf Creek, in front of station; top of rail	1, 293. 8

Wolf Creek, 2.7 miles north of, 10 feet west of track, 30 feet south of trestle, 65 feet south of milepost 506; iron post stamped "1516 B 1903"	Feet. 1,516.658
Glendale, in front of station; top of rail	1,417.9
Glendale, 14 feet northeast of southeast corner of Hotel Glendale; iron post stamped "1425 B 1903"	1,426.237
Glendale, 2.6 miles north of, highway crossing, 25 feet north of track, 5 feet west of east fence; iron post stamped "1366 B 1903"	1,367.243
West Fork, 16.2 miles north of, 300 feet south of milepost 539, on side of track, at fence line; iron post stamped "752 B 1903"	753.161
Glenbrook, 90 feet east of sign post, 60 feet west of prune drier, on line with front of building, 78 feet north of main track, 8 feet east of creek; iron post stamped "721 B 1903"	722.104
Riddles, 30 feet in front of Riddle Hotel, at edge of walk to station; iron post stamped "705 B 1903"	706.096
Riddles, in front of station; top of rail	709.2
Riddles, 3.5 miles north of, west side of railroad, at fence line opposite milepost 549; iron post stamped "642 B 1903"	642.396

## DOTHAN QUADRANGLE.

## California-Oregon State line to Portland, Oreg. (portion of line).

Glendale, 5.8 miles north of, 250 feet north of milepost 515, 25 feet east of track; iron post stamped "1288 B 1903"	1,288.846
Glendale, 8.6 miles north of, 35 feet east of railroad, 120 feet south of old white house, 200 feet south of milepost 518; iron post stamped "1188 B 1903"	1,188.367
Glendale, 11.7 miles north of, 7 feet east of track, 10 feet south of milepost 521; iron post stamped "1099 B 1903"	1,099.996
West Fork, in front of station; top of rail	1,024.0
West Fork, 1.5 miles north of, 180 feet north of milepost 524, 12 feet east of rail; iron post stamped "993 B 1903"	993.983
West Fork, 4.3 miles north of, 10 feet north of railroad, 360 feet south of milepost 527; iron post stamped "930 B 1903"	931.334
West Fork, 8.4 miles north of, 300 feet north of milepost 531, 10 feet north of track; iron post stamped "853 B 1903"	853.983
West Fork, 10.3 miles north of, 15 feet south of milepost 533, 10 feet east of railroad; iron post stamped "824 B 1903"	825.277
West Fork, 13.3 miles north of, 10 feet north of milepost 536, 10 feet east of track; iron post stamped "793 B 1903"	793.646

## ROSEBURG QUADRANGLE.

## California-Oregon State line to Portland (portion of line).

Myrtle Creek, 15 feet east of track, on line with end of station; iron post stamped "612 B 1903"	612.859
Myrtle Creek, in front of station; top of rail	613.9
Myrtle Creek, 3.3 miles north of, east side of railroad, at fence line, 135 feet south of milepost 555; iron post stamped "586 B 1903"	586.855
Ruckels, in front of station; top of rail	572.0
Ruckels, 1.7 miles north of, east side of railroad, fence line, 4 feet from milepost 558; iron post stamped "570 B 1903"	570.636
Ruckels, 4.7 miles north of, east side of railroad, at fence line, 65 feet south of milepost 561; iron post stamped "553 B 1903"	553.382

	Feet.
Dillard, in front of station; top of rail-----	521. 6
Dillard, 0.9 mile north of, west side of railroad, at fence line, 600 feet north of milepost 564; iron post stamped "512 B 1903"-----	513. 211
Dillard, 3.6 miles north of, east side of railroad, at highway crossing, 25 feet east of track; iron post stamped "558 B 1903"-----	559. 120
Green, in front of station; top of rail-----	513. 7
Green, 1 mile north of, east side of railroad, at fence line, 30 feet north of milepost 570, iron post stamped "501 B 1903"-----	501. 637
Roseburg, in front of station; top of rail-----	463. 1
Roseburg, corner of Pine and Oak Streets, northeast angle of street, 180 feet east of rail; iron post stamped "464 B 1903"-----	464. 705
Roseburg, 2.1 miles north of, west side of railway, 5 feet from fence, 105 feet north of milepost 576; iron post stamped "500 B 1903"-----	500. 741
Roseburg, 5 miles north of, east side of railroad, at fence line, 3 feet south of milepost 579; iron post stamped "472 B 1903"-----	473. 173
Winchester, in front of station; top of rail-----	458. 3
Wilbur, 0.8 mile south of, east side of railroad, at fence line, 190 feet south of milepost 582; iron post stamped "497 B 1903"-----	497. 684
Wilbur, in front of station; top of rail-----	465. 1.
Wilbur, 2.3 miles north of, west side of railroad, 8 feet from fence, 150 feet south of milepost 585; iron post stamped "486 B 1903"-----	486. 481
Wilbur, 5.4 miles north of, at road crossing, 15 feet west of track south side of road, at old warehouse; iron post stamped "538 B 1903"-----	539. 021
Oakland, 150 feet east of main track, at railway station, north margin of highway, 75 feet west of front face of Hotel Thomas; iron post stamped "429 B 1903"-----	429. 586
Oakland, in front of station; top of rail-----	427. 1
Oakland, 3.4 miles north of, east side of railroad, at fence line, 135 feet south of milepost 594; iron post stamped "464 B 1903"-----	464. 521

## DRAIN QUADRANGLE.

## California-Oregon State line to Portland, Oreg. (portion of line).

Oakland, 6.4 miles north of, east side of railroad, at fence line, 3 feet south of milepost 597; iron post stamped "584 B 1903"-----	584. 672
Oakland, 9.5 miles north of, at highway crossing, 14 feet east of track, 20 feet south of fence line; iron post stamped "617 B 1903"-----	617. 606
Oakland, 12.3 miles north of, east side of railroad, at fence line, 300 feet south of milepost 603; iron post stamped "389 B 1903"-----	389. 577
Yoncalla, in front of station; top of rail-----	354. 6
Yoncalla, 1.9 miles north of, east side of railroad, at fence line, 4 feet south of milepost 607; iron post stamped "329 B 1903"-----	329. 726
Drain, in front of station; top of rail-----	295. 6
Drain, 585 feet north of north end of station, 15 feet west of main track, at east end of margin of highway; iron post stamped "298 B 1903"-----	298. 667
Leona, 40 feet south of station, east side of track, at fence line, 4 feet north of milepost 613; iron post stamped "324 B 1903"-----	324. 250
Leona, in front of station; top of rail-----	324. 1
Leona, 3 miles north of, east side of railroad, at fence line, 3 feet south of milepost 616; iron post stamped "370 B 1903"-----	370. 853

Comstock, 0.2 mile south of, east side of railroad, 165 feet north of milepost 619, at fence line; iron post stamped "438 B 1903"-----	Feet. 438.224
Comstock, in front of station; top of rail-----	449.0
Comstock, 2.9 miles north of, 530 feet north of milepost 622, 15 feet west of track, at telegraph pole; iron post stamped "676 B 1903"-----	677.030
Divide, 1.7 miles north of, west side of railroad, at fence line, opposite milepost 625; iron post stamped "690 B 1903"-----	690.835
Cottage Grove, in front of station; top of rail-----	642.2
Cottage Grove, 250 feet north of station, 25 feet east of main track, northwest corner of planing mill; iron post stamped "642 B 1903"-----	642.518
Saginaw, in front of station; top of rail-----	610.3
Saginaw, 0.8 mile north of, east side of railroad, at fence line, 150 feet south of milepost 631; iron post stamped "603 B 1903"-----	603.359
Walker, in front of station; top of rail-----	599.1
Walker, 2.2 miles north of, east side of railroad, at fence line, 3 feet north of milepost 634; iron post stamped "572 B 1903"-----	572.865
Creswell, in front of station; top of rail-----	541.3
Creswell, 0.3 mile north of, east side of railroad, at fence line, 90 feet north of milepost 637; iron post stamped "546 B 1903"-----	547.016
Creswell, 3.2 miles north of, at highway crossing, 8 feet west of rail, north margin of highway; iron post stamped "513 B 1903"-----	513.390
Goshen, in front of station; top of rail-----	500.2

**EUGENE 15' QUADRANGLE.**

California-Oregon State line to Portland, Oreg. (portion of line).

Goshen, 0.8 mile north of, west side of railroad, 135 feet south of milepost 643, at fence line; iron post stamped "493 B 1903"-----	493.960
Henderson, 30 feet west of main track, 35 feet south of station sign; iron post stamped "446 B 1903"-----	447.160
Henderson, in front of station; top of rail-----	446.5
Eugene, University of Oregon grounds, northeast corner, front face of Villard Hall; aluminum tablet stamped "449 B 1903"-----	449.317
Eugene, in front of station; top of rail-----	426.4
Eugene, 1.5 miles north of, east side of railroad, 4 feet south of milepost 650; iron post stamped "407 B 1903"-----	407.365
Eugene, 4.9 miles north of, highway crossing, east side of track, north margin of highway; iron post stamped "382 B 1903"-----	382.463
Irving, in front of station; top of rail-----	376.8
Irving, 1.8 miles north of, east side of railroad, 5 feet from fence, at milepost 656; iron post stamped "363 B 1903"-----	363.480
Irving, 4.7 miles north of, east side of railroad, 8 feet from fence, at milepost 659; iron post stamped "340 B 1903"-----	340.799
Junction City, in front of station; top of rail-----	325.8
Junction City, 1.2 miles north of, east side of railroad, at first telegraph pole north of milepost 663, 11 feet from fence; iron post stamped "319 B 1903"-----	319.211

**HALSEY 15' QUADRANGLE.**

California-Oregon State line to Portland, Oreg. (portion of line).

Harrisburg, 140 feet south of station, 15 feet east of track, at telegraph pole; iron post stamped "307 B 1903"-----	307.653
Harrisburg, in front of station; top of rail-----	309.2

Harrisburg, 2.7 miles north of, east side of railroad, 4 feet from fence line, third telegraph pole south of milepost 669; iron post stamped "302 B 1903"-----	Feet. 302. 779
Harrisburg, 5.8 miles north of, east side of railroad, at milepost 672, 3 feet from fence line; iron post stamped "291 B 1903"-----	291. 589
Halsey, 100 feet north of station, 18 feet east of track, on line with north margin of street to east; iron post stamped "281 B 1903"----	281. 502
Halsey, in front of station; top of rail-----	282. 4
Halsey, 3.2 miles north of, east side of railroad, 4 feet from milepost 678, at fence line; iron post stamped "266 B 1903"-----	266. 504
Shedd, in front of station; top of rail-----	262. 8
Shedd, 1.9 miles north of, east side of railroad, at fence line, third telegraph pole south of milepost 682; iron post stamped "249 B 1903"-----	249. 485

**ALBANY 15' QUADRANGLE.**

California-Oregon State line to Portland, Oreg. (portion of line).

Shedd, 4 miles north of, east side of railroad, fence line at first telegraph pole south of milepost 684; iron post stamped "242 B 1903"-----	242. 819
Tangent, in front of station; top of rail-----	245. 3
Tangent, 1.3 miles north of, east side of railroad, at fence line, first telegraph pole south of milepost 687; iron post stamped "240 B 1903"-----	240. 761
Tangent, 4.3 miles north of, east side of railroad, 4 feet from fence line, at milepost 690; iron post stamped "221 B 1903"-----	221. 763
Albany, 115 feet west of station, north margin of Lyon Street, 15 feet west of side track; iron post stamped "212 B 1903"-----	212. 367
Albany, in front of station; top of rail-----	214. 1
Albany, 3.1 miles north of, highway crossing, 16 feet east of railroad, 3 feet north of milepost 695; iron post stamped "210 B 1903"-----	211. 025
Millersburg, in front of station; top of rail-----	245. 0
Millersburg, 1.6 miles north of, east side of railroad, 8 feet from fence, at second telegraph pole north of milepost 698; iron post stamped "214 B 1903"-----	214. 256
Jefferson, in front of station; top of rail-----	241. 1
Jefferson, 0.5 mile north of, east side of railroad, fence line at first telegraph pole north of milepost 701, 90 feet south of road crossing; iron post stamped "235 B 1903"-----	235. 546

**LEBANON 30' QUADRANGLE.**

California-Oregon State line to Portland, Oreg. (portion of line).

Jefferson, 3.4 miles north of, east side of railroad, at fence line, second telegraph pole south of milepost 704; iron post stamped "287 B 1903"-----	287. 961
Marion, in front of station; top of rail-----	300. 6
Marion, 1.8 miles north of, west side of railroad, fence line opposite milepost 707; iron post stamped "327 B 1903"-----	327. 868
Marion, 4.9 miles north of, west side of railroad, fence line 110 feet north of milepost 710; iron post stamped "308 B 1903"-----	308. 809
Turner, in front of station; top of rail-----	284. 3
Turner, 1.4 miles north of, west side of railroad at fence line, 30 feet north of milepost 713; iron post stamped "261 B 1903"-----	261. 862

**SALEM 15' QUADRANGLE.**

California-Oregon State line to Portland, Oreg. (portion of line).

Turner, 4.8 miles north of, east side of railroad, 15 feet from rail, 6 feet south of road crossing, fence; iron post stamped "207 B 1903"-----	Feet. 207.940
Salem, in front of station; top of rail-----	163.0
Salem, State capitol, south face, at entrance; aluminum tablet stamped "171 B 1903"-----	171.388
Salem, 2.8 miles north of, east side of railroad, 8 feet from fence, at milepost 722; iron post stamped "162 B 1903"-----	162.219

**OREGON CITY 30' QUADRANGLE.**

California-Oregon State line to Portland, Oreg. (portion of line).

Chemawa, in front of station; top of rail-----	162.1
Chemawa, 50 feet north of entrance to Indian training school, 20 feet east of track; iron post stamped "163 B 1903"-----	163.411
Brooks, in front of station; top of rail-----	182.8
Brooks, 215 feet north of station, 11 feet east of track; iron post stamped "183 B 1903"-----	183.248
Brooks, 4.2 miles north of, east side of railroad at first telegraph pole north of milepost 732, 8 feet from fence; iron post stamped "182 B 1903"-----	182.124
Gervais, in front of station; top of rail-----	184.7
Gervais, 1 mile north of, east side of railroad, at fence line, 5 feet south of milepost 734; iron post stamped "183 B 1903"-----	183.952
Woodburn, 210 feet south of station, 36 feet east of main track; iron post stamped "181 B 1903"-----	181.927
Woodburn, in front of station; top of rail-----	181.2
Hubbard, in front of station; top of rail-----	182.7
Hubbard, 240 feet north of station, 12 feet east of main track; iron post stamped "183 B 1903"-----	183.412
Hubbard, 3.2 miles north of, east side of railroad, at first telegraph pole south of milepost 743, 18 feet from fence; iron post stamped "184 B 1903"-----	184.000
Aurora, in front of station; top of rail-----	119.7
Barlow, 50 feet north of station, 25 feet east of main track; iron post stamped "100 B 1903"-----	100.391
Canby, 1.1 miles north of, at second telegraph pole south of milepost 749, 18 feet east of track; iron post stamped "130 B 1903"-----	130.032
New Era, in front of station; top of rail-----	91.9
New Era, 0.9 mile north of, east side of railroad at milepost 752, at fence line; iron post stamped "89 B 1903"-----	89.257
Oregon City, 1.5 miles south of, 7 feet north of milepost 755, 7 feet east of rail, at fence line; iron post stamped "66 B 1903"-----	66.822
Oregon City, in front of station; top of rail-----	75.2
Paper mill, 200 feet south of, 16 feet east of track, at first telegraph pole; iron post stamped "45 B 1903"-----	45.122
Paper mill, in front of station; top of rail-----	47.2
Clackamas, 248 feet south of station, 27 feet east of main track, at telegraph pole; iron post stamped "108 B 1903"-----	108.928
Clackamas, in front of station; top of rail-----	111.2
Clackamas, 3 miles north of, east side of railroad, at fence line, 3 feet north of milepost 764; iron post stamped "109 B 1903"-----	108.970

	Feet.
Milwaukee, in front of station; top of rail.....	95.7
Willsburg, in front of station; top of rail.....	59.9
Willsburg, 0.5 mile north of, 360 feet north of milepost 767, east side of track; iron post stamped "56 B 1903".....	56.176

**PORTLAND 15' QUADRANGLE.**

California-Oregon State line to Portland, Oreg. (portion of line).

Portland, 100 feet from center of post office, south side of yard, 40 feet from east and west street, near latitude pier; iron post stamped "51 A".....	51.016
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NOTE.—Owing to an addition to the post-office building, the above bench mark was replaced in September, 1908, by the following:

Portland, north front of post office; 2 feet east of doorway, first course of stone above water table, aluminum tablet stamped "54 A".....	54.106
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Birch Creek, Burns, Drewsey, Goldendale, Harney, Heisler, Mitchell Butte, Moro, Paulina, Prineville, Riley, Weiser, and Westfall Quadrangles.

**CROOK, HARNEY, MALHEUR, SHERMAN, AND WASCO COUNTIES.**

The elevations in the following list are the results of a line of precise leveling begun at Ontario and run west along a stage road to Riley, thence northwest to Prineville, thence north to Biggs.

The line connects with the line run from Huntington, Oreg., via Weiser, Idaho, to Ontario, Oreg., the bench marks on which were checked by the transcontinental precise level party of the Coast and Geodetic Survey. The elevations are based upon the adjusted heights at Ontario, and no adjustment has been made between that point and Biggs, this line furnishing the accepted elevation at Biggs to which the primary line from Astoria to Pasco is adjusted.

The leveling was done by C. H. Semper in 1903 and 1904, by the double-rodDED simultaneous method.

The standard bench marks are stamped with the letter "H" in addition to figures of elevation either 7 or 8 feet too low, the correction to the original being +7.5 feet.

**WEISER QUADRANGLE.**

At Ontario.

	Feet.
Ontario, in front of station; top of rail.....	2,152.7
Ontario, corner Main Street and road to station, 12 feet east of north- east corner at Brown's Hotel; iron post stamped "2132 H".....	2,150.773

**BIRCH CREEK QUADRANGLE.**

Ontario west along stage road 6 miles.

Ontario, 3.1 miles west of, south side of road, at corner of wire fence and road to ranch house; iron post stamped "2154 H".....	2,161.724
Ontario, 6 miles west of, south side of road, at crossing of irrigating ditch; iron post stamped "2173 H".....	2,180.371



## MITCHELL BUTTE QUADRANGLE.

Point 6 miles west of Ontario along stage road to point 16 miles west of Vale.

Ontario, 9.1 miles west of, north side of road in front of Jerry Brosnahan's ranch house at fence line; iron post stamped "2195 H"-----	Feet. 2, 202. 864
Ontario, 12.3 miles west of, south side of highway, telephone pole at margin of unused ditch; iron post stamped "2214 H"-----	2, 221. 569
Vale, northeast corner of courthouse; aluminum tablet stamped "2235 H"-----	2, 242. 108
Vale, 3 miles west of, 50 feet south of roadway; iron post stamped "2395 H"-----	2, 402. 497
Vale, 7 miles west of, directly opposite schoolhouse on north side of road and on line with east face of building; iron post stamped "2308 H"-----	2, 315. 656
Vale, 10.6 miles west of, Louis Paddick's ranch, south margin of road, 50 feet east of side of house; iron post stamped "2334 H"-----	2, 341. 869
Vale, 13.7 miles west of, in Malheur Canyon, at crossing of road and railroad bed, on south side of railroad bed; iron post stamped "2359 H"-----	2, 366. 445

## WESTFALL QUADRANGLE.

Point 16 miles west of Vale along stage road via Harper ranch to Westfall.

Vale, 16 miles west of, 10 feet north of railroad bed, at railroad borrow pit; iron post stamped "2384 H"-----	2, 391. 971
Vale, 20.3 miles west of, lower end of Little Valley, 20 feet north of road; iron post stamped "2434 H"-----	2, 441. 772
Vale, 22.3 miles west of, foot of road up big hill leading to lower Harper ranch, south side of railroad; iron post stamped "2460 H"-----	2, 467. 048
Lower Harper ranch, 1 mile west of, gate leading to main road to Westfall, 10 feet east of gate on fence line; iron post stamped "2504 H"-----	2, 511. 714
Lower Harper ranch, 3.1 miles west of, 15 feet north of road, 250 feet east of point of hill; iron post stamped "2585 H"-----	2, 592. 826
Lower Harper ranch, 6 miles west of, 20 feet south of road; iron post stamped "2712 H"-----	2, 719. 769
Lower Harper ranch, 10.1 miles west of, 15 feet east of road; iron post stamped "2965 H"-----	2, 972. 237

Westfall west along stage road via Beulah to point 4.6 miles west of stage station.

Westfall, between Jones's store and stone warehouse, at side of store; iron post stamped "2994 H"-----	3, 001. 344
Westfall, 3.1 miles west of, 10 feet north of road, 20 feet east of small creek bottom; iron post stamped "3108 H"-----	3, 115. 421
Westfall, 6.2 miles west of, 15 feet south of road; iron post stamped "3239 H"-----	3, 246. 515
Westfall, 9.4 miles west of, 10 feet south of road; iron post stamped "3426 H"-----	3, 433. 211
Westfall, 12 miles west of, 20 feet south of road, halfway up hill; iron post stamped "3786 H"-----	3, 793. 950
Stage station, 1.6 miles west of, 10 feet north of road; iron post stamped "4052 H"-----	4, 059. 469
Stage station, 4.6 miles west of, on south margin of road at big bend, near foot of hill; iron post stamped "4535 H"-----	4, 542. 311

## DREWSEY QUADRANGLE.

Point 4.6 miles west of stage station along stage road via Beulah and Drewsey  
to point 8.3 miles west of Drewsey.

Stage station, 7.7 miles west of, 15 feet north of road; iron post stamped "4454 H"-----	Feet. 4,461.305
Billy Wilson's, 1.5 miles west of, fence line at northwest angle of road to J. S. Hunter's house; iron post stamped "4103 H"-----	4,110.053
Billy Wilson's, 3.4 miles west of, 10 feet north of road; iron post stamped "3957 H"-----	3,964.430
Billy Wilson's, 6 miles west of, in Agency Valley, in front of T. L. Arnold's house, 15 feet south of gate; iron post stamped "3471 H"-----	3,478.260
Beulah, 25 feet east of, at east end of iron bridge over Malheur River, on north margin of road; iron post stamped "3269 H"---	3,276.015
Beulah, 2.8 miles west of, in valley at top of Agency Mountain, on south margin of road; iron post stamped "3838 H"-----	3,845.735
Beulah, 6 miles west of, 15 feet south of road, on south side of creek bottom; iron post stamped "3779 H"-----	3,786.243
Beulah, 8.6 miles west of, on north margin of road, 25 feet west of gate to Altnow's ranch house, at fence line; iron post stamped "3612 H"-----	3,619.075
Beulah, 12.1 miles west of, 90 feet east of bridge over Warm Spring Creek, 30 feet north of wire fence; iron post stamped "3523 H"---	3,530.420
Drewsey, southwest corner of A. J. Johnson & Bros. store; iron post stamped "3508 H"-----	3,515.811
Drewsey, 2.6 miles west of, 20 feet west of bridge over Stinking Water Creek, south side of stream; iron post stamped "3538 H"---	3,545.096
Drewsey, 5.4 miles west of, on new road over Stinking Water Mountain, 15 feet north of road; iron post stamped "3596 H"-----	3,603.860
Drewsey, 8.3 miles west of, on Stinking Water Mountain grade, 30 feet south of road; iron post stamped "4099 H"-----	4,106.297

## HARNEY QUADRANGLE.

Point 8.3 miles west of Drewsey along stage road via Harney to Burns.

Drewsey, 12.3 miles west of, top of Stinking Water Mountain, 20 feet south of road; iron post stamped "4718 H"-----	4,725.468
Drewsey, 14.5 miles west of, at upper end of Nigger Flat, 10 feet south of road; iron post stamped "4652 H"-----	4,659.110
Drewsey, 17.5 miles west of, in canyon 15 feet north of road, 1.1 miles east of old stage station; iron post stamped "4483 H"-----	4,490.547
Drewsey, 20.4 miles west of, 1 mile west of east end of Harney Valley, at west end of turnout in road; iron post stamped "4174 H"---	4,181.170
Drewsey, 23.3 miles west of, in Harney Valley, 70 feet north of road; iron post stamped "4132 H"-----	4,139.308
Drewsey, 26.4 miles west of, in Harney Valley, 0.3 mile west of old schoolhouse, south side of road; iron post stamped "4133 H"-----	4,140.591
Harney, 1.7 miles east of, at junction of main road and road to Steens Mountain, south side of road, 6 feet east of signpost; iron post stamped "4147 H"-----	4,154.173
Harney, at northeast corner of town hall, 7 feet from fence; iron post stamped "4161 H"-----	4,168.965

Harney, 2.9 miles west of, directly opposite William Krzeska's house, on side of road at fence line; iron post stamped "4138 H"-----	Feet. 4, 145. 385
Harney, 6.2 miles west of, 65 feet west of bridge on north margin of road; iron post stamped "4131 H"-----	4, 138. 497
Harney, 9.7 miles west of, at northeast corner of Poison Creek schoolhouse fence, on margin of road; iron post stamped "4146 H"-----	4, 154. 000

**BURNS QUADRANGLE.****Burns along stage road to Riley.**

Burns, front yard of county courthouse, 10 feet from fence and 4 feet north of walk leading to building; iron post stamped "4177 H"-----	4, 184. 979
Burns, 3.1 miles west of, 25 feet east of road; iron post stamped "4147 H"-----	4, 154. 641
Burns, 6.2 miles west of, at foot of hill, 10 feet south of road; iron post stamped "4160 H"-----	4, 167. 310
Burns, 8.9 miles west of, 50 feet west of Jenkins ranch house, on north side of road at fence line; iron post stamped "4138 H"-----	4, 145. 318
Burns, 12.9 miles west of, on south margin of road at fence line, 4 feet west of, gate leading to Calkins ranch house; iron post stamped "4195 H"-----	4, 202. 363
Burns, 16 miles west of, 15 feet south of road, in foothills; iron post stamped "4404 H"-----	4, 411. 545
Burns, 19.2 miles west of, 30 feet north of road; iron post stamped "4552 H"-----	4, 559. 907
Burns, 21.9 miles west of, 600 feet west of summit of small hill, 40 feet south of road; iron post stamped "4153 H"-----	4, 160. 378
Riley, 2.9 miles east of, 15 feet south of road; iron post stamped "4318 H"-----	4, 325. 597
Riley, at fence front of Fred Oakerman's house, opposite post office; iron post stamped "4210 H"-----	4, 217. 596

**RILEY QUADRANGLE.****Riley west along stage road to Street's ranch.**

Riley, 4.1 miles west of, at corner of road leading to schoolhouse, near wire-fence line; iron post stamped "4264 H"-----	4, 271. 651
Riley, 7.3 miles west of, W. B. Johnson's upper ranch house at southwest corner of yard fence; iron post stamped "4295 H"-----	4, 302. 424
Riley, 11 miles west of, north margin of road, on line with south face of Cecil ranch house; iron post stamped "4345 H"-----	4, 352. 825
Cecil's, 2.8 miles west of, 0.3 mile east of Dry Lake, 20 feet south of road; iron post stamped "4761 H"-----	4, 768. 897
Cecil, 5.8 miles west of, 21 feet south of road, 100 feet north of small hill with bowlders along top; iron post stamped "4722 H"-----	4, 729. 418
Cecil's, 9 miles west of, south side of stage road at forks of road leading to spring; iron post stamped "5058 H"-----	5, 065. 426
Cecil's, 12.4 miles west of, west side of pine woods, at edge of clearing, 20 feet south of road; iron post stamped "5408 H"-----	5, 415. 999
Cecil's, 14.9 miles west of, in canyon 0.5 mile east of junction of road to Paulina; iron post stamped "5061 H"-----	5, 068. 999
Street's, gate leading into yard of James Street's ranch, at line of fence; iron post stamped "4776 H"-----	4, 783. 933

## PAULINA QUADRANGLE.

Street's ranch north along stage road via Paulina to point 10.9 miles west of Post.

	Feet.
Street's, 3.8 miles north of, south side of small hill, 12 feet east of road; iron post stamped "4791 H"-----	4, 798. 541
Street's, 6.7 miles north of, north end of pasture fence, 1,000 feet north of deserted house, 45 feet east of road; iron post stamped "4602 H"-----	4, 609. 049
Street's, 11 miles north of, west side of road at mail-box post; iron post stamped "4478 H 1903"-----	4, 485. 369
Street's, 13.1 miles north of, northwest corner of Hardin's yard; iron post stamped "4507 H"-----	4, 514. 269
Hardin's, 2.6 miles north of, at summit of hill, 30 feet west of road; iron post stamped "4757 H"-----	4, 764. 730
Hardin's, 5 miles north of, 25 feet north of creek crossing at fence line east of road; iron post stamped "4290 H"-----	4, 297. 058
Smith's, in front of F. M. Smith's ranch house, 15 feet south of gate, on line of fence; iron post stamped "3963 H"-----	3, 970. 545
Smith's, 3.4 miles north of, at top of hill, 400 feet north of forks of road; iron post stamped "3925 H"-----	3, 932. 348
Smith's 6.8 miles north of, 25 feet east of road, 600 feet north of top of small hill; iron post stamped "3767 H"-----	3, 774. 507
Paulina, southwest corner of Paulina Hall, 1 foot from building; iron post stamped "3676 H"-----	3, 683. 726
Paulina, 2.6 miles west of, on line with east side of J. D. Dunkle's house, 20 feet from road; iron post stamped "3660 H"-----	3, 667. 266
Paulina, 5.8 miles west of, near gate leading to Gilchrist ranch house, 150 feet east of bridge over Crooked River, on north fence line; iron post stamped "3625 H"-----	3, 632. 300
Paulina, 8.8 miles west of, near gate leading to corral at stage station, on line of fence; iron post stamped "3583 H"-----	3, 590. 427
Paulina, 12.5 miles west of, at Roberts & Nelson ranch, 100 feet west of house, at corner of fence; iron post stamped "3558 H"-----	3, 565. 234
Paulina, 14.6 miles west of, small bridge over creek, in front of Henry Cox's ranch, south fence line; iron post stamped "3536 H"-----	3, 543. 675
Stewart's, 2 miles west of, in front of ranch house of W. W. Harris, at fence; iron post stamped "3473 H"-----	3, 480. 091
Stewart's, 3.9 miles west of, 20 feet north of road, opposite juniper tree, with two mail boxes of W. R. Kelley; iron post stamped "3526 H"-----	3, 513. 515
Stewart's, 7.4 miles west of, north fence line between deserted log house and barn; iron post stamped "3409 H"-----	3, 416. 745
Stewart's, 10.2 miles west of, forks of road to left, 0.25 mile east of post office, north side of road, 10 feet from fence; iron post stamped "3388 H"-----	3, 395. 443
Post, 3.4 miles west of, at corner of wire fence, in front of G. F. Wellborn's house; iron post stamped "3339 H"-----	3, 346. 551
Post, 6.9 miles west of, in front of Williamson & Gesnor ranch house, at northwest corner of yard fence; iron post stamped "3280 H"-----	3, 296. 035
Post, 10.9 miles west of, in front of Davis ranch house, at northwest corner of yard fence; iron post stamped "3261 H"-----	3, 268. 815

## PRINEVILLE QUADRANGLE.

Point 10.9 miles west of Post north along stage road via Prineville to Grizzly.

Post, 14.3 miles west of, at Ralph Porfly's upper ranch, north corner of lane leading to house, on line with road fence; iron post stamped "3708 H"-----	Feet. 3,715.115
Post, 16.8 miles west of, east corner of fence, road leading to house of R. W. Breaser, at fence line; iron post stamped "4027 H"-----	4,034.668
Breaser ranch, 3.5 miles west of, 15 feet east of east face of S. W. Yengey's house; iron post stamped "4023 H"-----	4,030.964
Breaser ranch, 7.5 miles west of, in front of Fewerhelm Radloff's house, at line of picket fence; iron post stamped "3215 H"-----	3,222.561
Prineville, county courthouse, at main entrance gate, 10 feet from fence, 2 feet from walk; iron post stamped "2860 H"-----	2,867.495
Prineville, 3.1 miles north of, northeast corner of W. T. Davenport's yard fence, at margin of road; iron post stamped "2849 H"-----	2,855.982
Prineville, 6.7 miles north of, 250 feet northeast of Fred Stewart's ranch house, east margin of road, at telephone pole; iron post stamped "2962 H"-----	2,969.892
Prineville, 8.6 miles north of, C. W. Circle's ranch, 150 feet north of house, at gate to barn; iron post stamped "3127 H"-----	3,134.724
Prineville, 12.2 miles north of, 20 feet north of L. M. Delano's house, near top of mountain, on line with front fence; iron post stamped "3975 H"-----	3,982.174
Grizzly, 0.5 mile north of, at southwest corner of Wills Bros.' store; iron post stamped "3692 H"-----	3,690.559

## HEISLER QUADRANGLE.

Grizzly north along stage road via Hay Creek to Shaniko.

Grizzly, 4.7 miles north of, in front of W. M. Joslin's house, southwest corner of yard; iron post stamped "3643 H"-----	3,650.567
Grizzly, 7.4 miles north of, forks of road, near signboard "Prineville 21 miles, Rim Rock Springs 8 miles;" iron post stamped "3152 H"-----	3,150.281
Hay Creek, southwest corner of yard of ranch house, at line of road; iron post stamped "2938 H"-----	2,945.644
Hay Creek, 2.1 miles north of, in front of R. Parish's ranch, 15 feet south of gate at fence line; iron post stamped "2757 H"-----	2,764.298
Hay Creek, 7.2 miles north of, lane leading to McPherson ranch house, 60 feet west of highway; iron post stamped "1965 H"-----	1,972.193
Heisler station, east side of yard, 20 feet south of northeast corner; iron post stamped "1869 H"-----	1,876.526
Heisler, 3.7 miles north of station, in front of Priday Bros. ranch house, south corner of lane to house and highway, at fence line; iron post stamped "1686 H"-----	1,693.367
Heisler, 5.9 miles north of; surface of water in Trout Creek at bridge, June 1, 1904-----	1,765.2
Heisler, 7.3 miles north of, in front of J. J. Haight's ranch house, farm gate leading to house; iron post stamped "1848 H"-----	1,855.624
Heisler, 11.6 miles north of, in front of C. B. Durbin's ranch house, northwest corner of yard fence; iron post stamped "2127 H"-----	2,134.021
Heisler, 17.4 miles north of, in front of Polk May's ranch house, 10 feet north of gate, at fence line; iron post stamped "2484 H"-----	2,491.285

Antelope, Main street, southeast corner of cart house No. 1, 3 feet from walk; iron post stamped "2622 H"-----	Feet. 2, 629. 821
Antelope, 1.5 miles north of, in front of small house owned by village of Antelope, 7 feet north of gate; iron post stamped "3083 H"-----	3, 090. 693
Shaniko, southwest corner of lot of Leader office building, 300 feet north of Moody's warehouse, on line of street; iron post stamped "3334 H"-----	3, 341. 095

**MORO QUADRANGLE.**

**Shaniko north along Oregon-Washington Railroad & Navigation Co.'s track to Moro.**

Shaniko, 4.1 miles north of, 540 feet south of road crossing, 37 feet west of track; iron post stamped "3112 H"-----	3, 119. 593
Shaniko, 6.6 miles north of, at road crossing, 30 feet west of rail, 30 feet north of highway; iron post stamped "3018 H"-----	3, 025. 533
Shaniko, 9.8 miles north of, 50 feet south of south end of trestle 59, 22 feet east of track; iron post stamped "2810 H"-----	2, 817. 715
Wilcox, 200 feet south of warehouse, 17 feet east of track, 14 feet north of telephone pole; iron post stamped "2623 H"-----	2, 630. 403
Kent, 14 feet east of road crossing, north end of warehouse; iron post stamped "2701 H"-----	2, 708. 315
Kent, 2.5 miles north of, at private road crossing, 25 feet east of track, 40 feet south of crossing; iron post stamped "2699 H"-----	2, 706. 702
Kent, 6.6 miles north of, at Oregon-Washington Railroad & Navigation Co. warehouse, east end of west building, 11 feet from track; iron post stamped "2467 H"-----	2, 474. 621
Kent, 9.7 miles north of, at railroad crossing 25 feet west of track, 4 feet from crossing sign; iron post stamped "2457 H"-----	2, 464. 189
Kent, 11.9 miles north of, at railroad crossing of main highway, 18 feet east of track at crossing signpost; iron post stamped "2379 H"-----	2, 386. 434
Grass Valley, in front of station; top of rail-----	2, 268. 8
Grass Valley, at south end of railroad station, 10 feet east of track, 3 feet from sidewalk; iron post stamped "2261 H"-----	2, 268. 328
Grass Valley, 2.1 miles north of, road crossing at I. O. O. F. cemetery, 20 feet west of track, 10 feet south of road; iron post stamped "2383 H"-----	2, 300. 358
Grass Valley, 7 miles north of, at crossing of main road between Grass Valley and Moro, 12 feet west of track, 3 feet south of crossing sign; iron post stamped "2155 H"-----	2, 162. 228
Grass Valley, 9.3 miles north of, 35 feet east of road crossing at Leonard More's ranch house, 40 feet north of; iron post stamped "1935 H"-----	1, 942. 565
Moro, in front of station; top of rail-----	1, 790. 4
Moro, 30 feet west of track, 15 feet north of station; iron post stamped "1782 H"-----	1, 789. 939

**GOLDENDALE QUADRANGLE.**

**Moro along Oregon-Washington Railroad & Navigation Co.'s track to Biggs.**

De Moss, 60 feet south of station, 12 feet east of track, at crossing signpost; iron post stamped "7565 H"-----	1, 572. 031
McDonald's bridge, southwest corner of office; iron post stamped "1325 H"-----	1, 332. 925

Klondyke, 1 mile east of, 100 feet west of road crossing, 15 feet north of track at corner of fence; iron post stamped "1527 H"-----	Feet 1,534.246
Klondyke, in front of station; top of rail-----	1,547.6
Klondyke, 2 miles west of, in front of C. C. Kilney's ranch house, 50 feet east of east face of house, 28 feet north of track at corner of fence; iron post stamped "1446 H"-----	1,453.544
Wasco station, 25 feet south of, north margin of highway, 18 feet east of track; iron post stamped "1263 H"-----	1,270.026
Wasco, 2.9 miles north of, 100 feet north of road crossing at Sink ranch, 10 feet east of track; iron post stamped "1021 H"-----	1,028.790
Biggs, 0.5 mile east of Oregon-Washington Railroad & Navigation Co. Y, 330 feet east of water tank, 140 feet west of bridge over Spanish Hollow Creek, 27 feet south of Oregon-Washington Railroad & Navigation Co. main track; iron post stamped "164 H"---	171.409

### PRIMARY LEVELING.

Arlington, Astoria, Baker City, Birch Creek, Blalock Island, Carson, Cathlamet, Gibbon, Goldendale, Kalama, La Grande, Pendleton, Portland, Stevenson, St. Helen, Telocaset, The Dalles, Troutdale, and Umatilla Quadrangles.

BAKER, CLATSOP, COLUMBIA, GILLIAM, MORROW, MULTNOMAH, SHERMAN, UMATILLA, UNION, AND WASCO COUNTIES.

The elevations in the following list are corrected values along double-rodged lines previously published in appendixes to the Twentieth and Twenty-first annual reports of the United States Geological Survey. They are based primarily upon bench marks of the Coast and Geodetic Survey at Astoria, and between that place and Portland the original figures have been retained. Between Huntington and the Washington-Oregon State line the line was resurveyed, many of the bench marks were redetermined, and some were reset by the transcontinental precise level party of the Coast and Geodetic Survey, and all the bench marks have been adjusted to accord with the 1905 results obtained by that survey. They also accord at Biggs with the elevation brought by precise leveling, via Prineville, from the corrected height at Ontario. On account of closures on Blalock Island and Umatilla quadrangles in 1906 and 1907, respectively, the adjustment made in 1905 was abandoned between Biggs and Pendleton, Oreg., and between Umatilla and Wallula, Wash., and a new adjustment made as follows: First, a rod correction of 0.001 foot per foot, increasing original differences, has been applied to the line published in the Twenty-first Annual Report, as was found necessary by comparison with the Coast and Geodetic Survey work; second, a remaining closure error of 1.4 foot in circuit, via Umatilla, from Wallula, Wash., to Pendleton, has been distributed; and third, the line between Arlington and Umatilla has been raised to agreement without additional adjustment, and the remaining error, 1.3 feet, distributed on the line between Biggs and Arlington.

The leveling from Astoria to Arlington was done in 1898 by J. H. Carlock, and the leveling along the other lines was done in 1899 by H. S. Crowe.

The standard bench marks are stamped with the letter "A." Some of the figures of elevation as stamped are as much as 8 feet too low near the Huntington end of the line.

**ASTORIA QUADRANGLE.****Astoria along Astoria & Columbia River Railroad to Goble.**

John Day, 200 feet southwest of station, west end of bridge over John Day River, 150 feet north of residence of Mr. Keefe; iron post stamped "22 A"-----	Feet. 21.579
Svenson, in front of station; top of rail-----	9.0
Svenson, 85 feet south of station and post office, 5 feet west of road bearing north and south; iron post stamped "8 A"-----	8.499
Knappa, 130 feet north of station, 50 feet west of road bearing north and south, and 300 feet south of Knappa Hotel; iron post stamped "9 A"-----	8.729
Aldrigos Point, 5 miles east of Knappa, 40 feet north of track, 600 feet east of flag station, 300 feet north of house on hill, and 300 feet west of milepost 52; iron post stamped "10 A"-----	9.740

**OATHLAMET QUADRANGLE.****Astoria along Astoria & Columbia River Railroad to Goble (portion of line).**

Clifton, 80 feet northeast of station, 70 feet north of track, 80 feet south of water's edge in river; iron post stamped "8 A"-----	8.419
Westport and Clifton, about midway between, 100 feet south of house, 9 telegraph poles east of milepost 76, 5 telegraph poles west of bridge, 40 feet south of track; iron post stamped "12 A"-----	12.087
Westport, 200 feet southwest of station, 70 feet south of track, 40 feet east of water's edge, in Plympton Creek, 60 feet west of road; iron post stamped "20 A"-----	20.168
Westport, in front of station; top of rail-----	20.0
Marshland, 75 feet southwest of station, 40 feet south of track, 8 feet west of road; iron post stamped "15 A"-----	15.092
Marshland, in front of station; top of rail-----	14.0
Clatskanie, in front of station; top of rail-----	16.0
Clatskanie, 200 feet east of station, 75 feet south of railroad, 20 feet south of public road; iron post stamped "23 A"-----	22.638
Quincy, in front of station; top of rail-----	17.0
Quincy, 40 feet southeast of station, 400 feet south of house, 60 feet south of track; iron post stamped "18 A"-----	18.415
Mayger, 250 feet southwest of station, 200 feet south of track, 220 feet north of Mayger's residence; iron post stamped "18 A"-----	17.953
Mayger, in front of station; top of rail-----	18.0
Pyramid, in front of station; top of rail-----	19.0
Rinearson's slough, 150 feet south of bridge over, 40 feet southeast of water's edge and 80 feet northwest of residence of Mr. Smith; iron post stamped "9 A"-----	9.163



**KALAMA QUADRANGLE.**

<b>Astoria along Astoria &amp; Columbia River Railroad to Goble (portion of line).</b>	
Ranier, 200 feet east of post office, 200 feet southeast of Smith's Hotel, 40 feet east of house, 100 feet south of railroad; iron post stamped "26 A"-----	Feet. 26.016
Goble, 1,100 feet southwest of station, 300 feet northeast of G. S. Foster's house, 10 feet west of public road, 70 feet south of railroad; iron post stamped "29"-----	29.165
<b>Goble along Astoria &amp; Columbia River Railroad to Portland (portion of line).</b>	
Goble, in front of station; top of rail-----	27.0

**ST. HELEN QUADRANGLE.**

<b>Goble along Astoria &amp; Columbia River Railroad to Portland (portion of line).</b>	
Deer Island, in front of station; top of rail-----	49.0
Deer Island, 130 feet southwest of station; 100 feet southeast of post office, 100 feet west of track; iron post stamped "51 A"-----	50.818
Columbia, 60 feet north of station, 40 feet south of public road, 80 feet northeast of track; iron post stamped "78 A"-----	77.595
Columbia, in front of station; top of rail-----	80.0
Houlton, in front of station; top of rail-----	103.0
Houlton, 210 feet south of station, 40 feet east of post office, 60 feet west of railroad, 100 feet south of wagon road; iron post stamped "99 A"-----	98.700
Warren, in front of station; top of rail-----	48.0
Warren, 70 feet northeast of station, 60 feet east of railroad, 10 feet north of public road, 100 feet northwest of post office; iron post stamped "48 A"-----	48.407
Scappoose, 100 feet east of station, 90 feet northeast of track, 20 feet south of public road, 300 feet northeast of post office; iron post stamped "61 A"-----	60.727
Holbrook, 200 feet northwest of station platform, 230 feet east of store and house, 100 feet east of road, 120 feet west of railroad track; iron post stamped "35 A"-----	34.899

**PORTLAND QUADRANGLE.**

<b>Goble along Astoria &amp; Columbia River Railroad to Portland (portion of line).</b>	
Linnton, 210 feet east of station, 300 feet east of post office, 55 feet east of railroad track, 10 feet south of road; iron post stamped "40 A"-----	40.330
Portland, in front of station; top of rail-----	29.26
<b>Portland along Oregon-Washington Railroad &amp; Navigation Co.'s track to Oregon-Washington State line 6.2 miles south of Wallula, Wash. (portion of line).</b>	
Portland, north front of post office, 2 feet east of doorway, first course of stone above water table; aluminum tablet stamped "54 A"-----	54.106
Portland, in top of stone pier at south side of east end of steel bridge across Willamette River; copper belt stamped "29"-----	30.947
East Portland, in front of station; top of rail-----	31.0

## PRIMARY LEVELING.

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Portland Center, 55 feet south of track, 30 feet east of road, 10 feet north of road, and 200 feet east of house; iron post stamped "183 A"-----	Feet. 183.118
Clarnie, 250 feet northwest of platform for station, 150 feet east of bunk house, 60 feet north of track, 90 feet west of section house; iron post stamped "205 A"-----	204.753
Clarnie, in front of station; top of rail-----	212.0

## TROUTDALE QUADRANGLE.

Portland along Oregon-Washington Railroad & Navigation Co.'s track to Oregon-Washington State line 6.2 miles south of Wallula, Wash. (portion of line).

Fairview, in front of station; top of rail-----	114.
Fairview, 70 feet west of hotel, 140 feet east of Cleone post office, 110 feet south of track, and 50 feet south of wagon road; iron post stamped "114 A"-----	113.642
Troutdale, 100 feet northeast of station, 40 feet north of switch leading to Union Meat Co.'s establishment, 223 feet north of main track, in edge of field belonging to D. F. Buckridge; iron post stamped "41 A"-----	41.460
Corbett, 30 feet west of post office, 25 feet south of road, on line with post office, 60 feet south of main track; iron post stamped "46 A"-----	45.701
Lataurelle, in front of station; top of rail-----	44.3
Lataurelle, 50 feet south of station, 100 feet south of track, 50 feet north of road, 80 feet north of post office, 10 feet east of sidewalk, and 25 feet east of road; iron post stamped "57 A"-----	57.516
Bridal Veil, in front of station; top of rail-----	40.46
Bridal Veil, 80 feet south of track, 40 feet south of public road, in yard, 30 feet northeast of A. H. Willett's residence; iron post stamped "56 A"-----	55.736
Multnomah Falls, 320 feet north of base of, 70 feet south of track, 100 feet west of creek, 80 feet east of abandoned house; iron post stamped "46 A"-----	45.977

## STEVENSON QUADRANGLE.

Portland along Oregon-Washington Railroad & Navigation Co.'s track to Oregon-Washington State line 6.2 miles south of Wallula, Wash. (portion of line).

Warrendale, 150 feet south of post office, 50 feet south of track, 8 feet south of road, 90 feet southwest of platform for station; iron post stamped "77 A"-----	77.148
Bonneville, in front of station; top of rail-----	50.5
Bonneville, 75 feet southeast of station, 200 feet northwest of dancing pavilion in park, 250 feet south of hotel, 130 feet south of track; iron post stamped "53 A"-----	52.812
Cascade Locks, 330 feet northeast of post office, 400 feet northwest of station, 80 feet south of engineer's office, on Government reservation, 50 feet north of track; iron post stamped "99 A"-----	98.768

Wyeth, 40 feet east of bunk house, 49 feet west of section house, 40 feet south of road, 90 feet south of track; iron post stamped "97 A"-----	Feet. 97.068
Viento, in front of station; top of rail-----	102.7
Viento, 70 feet northeast of station, 30 feet southwest of store and post office, 20 feet north of switch, 80 feet north of track; iron post stamped "103 A"-----	103.153

## THE DALLES QUADRANGLE.

Portland along Oregon-Washington Railroad & Navigation Co.'s track to Oregon-Washington State line 6.8 miles south of Wallula, Wash. (portion of line).

Hood River, in front of station; top of rail-----	99.99
Hood River, 45 feet southeast of southeast corner of station, 130 feet north of hotel, 65 feet south of track, 30 feet west of wagon road; iron post stamped "103 A"-----	103.445
Mosier, 100 feet southeast of station, 100 feet north of A. Stewart's store, 60 feet west of wagon road, 80 feet south of track; iron post stamped "105 A"-----	105.397
Rowena, 200 feet southeast of station, 20 feet northeast of section house, 100 feet south of track; iron post stamped "146 A"-----	146.923
Milepost 83, 300 feet east of, 55 feet south of track, at switch head, 15 feet east of public road; iron post stamped "202 A"-----	202.448
The Dalles, 20 feet from southeast corner of Wasco County courthouse, 75 feet north of center of Third Street, and 75 feet west of center of Union Street; iron post stamped "103 A"-----	103.354
The Dalles, in front of Umatilla House; top of rail-----	96.6
Seufert's switch, west end connection of top of rail-----	133.9
Summit switch, 50 feet west of station, 290 feet northwest of station post, 55 feet north of track, and close to bank of Columbia River; iron post stamped "187 A"-----	187.825
Cello, 120 feet west of station, 60 feet south of post office in cannery building, 200 feet east of Taffe's house, 25 feet north of track; iron post stamped "159 A"-----	159.314
Cello, in front of station; top of rail-----	158.54

## GOLDENDALE QUADRANGLE.

Portland along Oregon-Washington Railroad & Navigation Co.'s track to Oregon-Washington State line 6.8 miles south of Wallula, Wash. (portion of line).

Deschutes, 80 feet southeast of station sign, 80 feet northwest of hotel, 100 feet south of track, 40 feet north of road; iron post stamped "166 A"-----	166.722
Biggs, 80 feet east of Henderson Hotel, 150 feet southeast of post office, 100 feet south of Oregon-Washington Railroad & Navigation Co.'s main line track, 100 feet north and 40 feet east of point of Y on Shaniko branch; iron post stamped "177 A"-----	177.285
Grant's, 270 feet southwest of station, 50 feet east of Wilson Hotel, 50 feet west of livery stable, 180 feet west of post office, 260 feet south of track; iron post stamped "171 A"-----	171.352
Grant's, in front of station; top of rail-----	175.0

## PRIMARY LEVELING.

.27

Rufus, 150 feet southwest of station, 250 feet southeast of wheat elevator, 50 feet from southeast corner of Union warehouse, and about 700 feet north of post office, 130 feet south of track; iron post stamped "179 A"-----	Feet. 179.474
John Days, 60 feet north of track, 30 feet northeast of section house, 200 feet west of bunk house, 1,000 feet west of west end of bridge over John Days River; iron post stamped "191 A"-----	191.801
Squally Hook, 80 feet northwest of station, 260 feet northwest of mile sign 123, 40 feet north of main track, 100 feet northeast of east end connection of switch; iron post stamped "193 A"-----	193.872

## ARLINGTON QUADRANGLE.

Portland, along Oregon-Washington Railroad & Navigation Co.'s track, to Oregon-Washington State line, 6.2 miles south of Wallula, Wash. (portion of line).

Quinn, 30 feet northwest of station board, 500 feet northeast of mile sign 127, 0.75 mile west of section house, 40 feet north of track; iron post stamped "226 A"-----	227.770
Blalocks, in front of station; top of rail-----	218.8
Blalocks, 140 feet southeast of station, 170 feet south of track, 180 feet southwest of water tank, 30 feet northeast of Hotel Bates; iron post stamped "214 A"-----	215.546
Arlington, in front of station; top of rail-----	225.9
Arlington, 80 feet east of station, 30 feet south of main track, 40 feet north of switch, 50 feet west of tool house, 50 feet northwest of warehouse 1, and 400 feet west of section house; iron post stamped "225 A"-----	226.661

Arlington to Umatilla (portion of line Portland to State line near Wallula, Wash.).

Arlington, 4 miles east of, 30 feet east of fifth telegraph pole, west of milepost 146, 100 feet south of track, 20 feet south of granite bowlder; iron post stamped "225 A"-----	226.601
Heppner Junction, 18 feet west of station, 10 feet south of track; iron post stamped "240 A" (reset by railroad company and by 1906 levels) -----	242.029

## BLALOCK ISLAND QUADRANGLE.

Arlington to Umatilla (portion of line Portland to State line near Wallula, Wash.).

Milepost 157, 300 feet east of, 21 feet south of center of track, above small fill on hillside; iron post stamped "240 A"-----	241.477
Castle Rock, 90 feet east of east end of station; 15 feet south of milepost 162; iron post stamped "240 A"-----	242.343
Castle Rock, at section house, base of rail, center of track-----	242.8
Milepost 167, 75 feet southeast of, 45 feet south of track; iron post stamped "247 A"-----	249.0
Coyote, in front of section house; base of rail-----	253.7

Milepost 172, 90 feet west of, 21 feet south of center of track; iron post stamped "271 A"-----	Feet. 273. 324
Milepost 177, 35 feet west of, 30 feet south of center of track; iron post stamped "278 A"-----	280. 160

**UMATILLA QUADRANGLE.**

**Arlington to Umatilla (portion of line Portland to State line near Wallula, Wash.).**

Milepost 182, 18 feet south of, 30 feet south of center of track; iron post stamped "288 A"-----	289. 792
Umatilla River, base of rail at end of steel bridge-----	295. 22
Umatilla, 48 feet east of northeast corner of water tank in lot between tank and roadmaster's office, 24 feet west of northwest corner of roadmaster's office, 25 feet north of center of track; iron post stamped "294 A"-----	296. 084
Umatilla, in front of station; top of rail-----	295. 8

**Umatilla to Washington-Oregon State line (portion of line from Portland).**

Milepost 192, 45 feet north of, 15 feet north of track; iron post stamped "378 A"-----	379. 934
Cold Springs, 57 feet southwest of corner of section house, 25 feet north of center of track; iron post stamped "362 A"-----	363. 489
Juniper, at mouth of Juniper Canyon, 4 feet west of west corner of fence at section house, 18 feet northeast of center of track; iron post stamped "313 A"-----	314. 406

**Umatilla, along Oregon-Washington Railroad & Navigation Co.'s track, to Pendleton (portion of line).**

Milepost 192, 9 feet southeast of, 24 feet south of center of track; iron post stamped "451 A"-----	453. 238
Maxwell, base of rail, center of track-----	457. 3
Milepost 197, 90 feet northeast of, 55 feet north of center of track, 4 feet southeast of telegraph pole; iron post stamped "590 A"-----	592. 887
Foster, 3 feet east of corner of fence at section house, 120 feet northeast of milepost 202; iron post stamped "591 A"-----	593. 299
Echo, in front of station; top of rail-----	639. 0
Echo, 1.3 miles east of, 21 feet northeast of center of track, 50 feet east of crossing; iron post stamped "656 A" (removed in 1904)---	658. 348
Nolln, 4 feet south of fence at road crossing, 54 feet northeast of center of track; iron post stamped "732 A" (elevation as reset in 1907) -----	734. 007
Milepost 217, 0.6 mile east of, 27 feet south of center of track, 15 feet north of fence; iron post stamped "847 A" (redetermined in 1907)---	849. 873

**PENDLETON QUADRANGLE.**

**Umatilla along Oregon-Washington Railroad & Navigation Co.'s track to Pendleton (portion of line).**

Barnhart, 230 feet west of west end of warehouse, 6 feet west of signpost "Barnhart," 20 feet south of track; iron post stamped "908 A"---	910. 798
Pendleton, 3 miles west of, 2 feet east of gate in fence at road crossing, 72 feet north of track; iron post stamped "994 A"-----	997. 117

	Feet.
Pendleton, in front of station; top of rail-----	1,070.0
Pendleton, in second block of pilaster, base of west entrance of south side of Umatilla County courthouse, facing Alta Street; iron post stamped "1074 A"-----	1,077.707

**Pendleton along Oregon-Washington Railroad & Navigation Co.'s track to Huntington (portion of line).**

Milepost 236, 750 feet northeast of, 25 feet north of center of track, 6 feet east of telegraph pole; iron post stamped "1205 A"-----	1,208.838
Mission, base of rail opposite warehouse-----	1,221.01
Milepost 241, 900 feet west of, 21 feet west of, 21 feet south of center of track, 2 feet north of fence, 15 feet north of wagon road; iron post stamped "1355 A"-----	1,358.411
Cayuse, base of rail opposite warehouse-----	1,412.96

**GIBBON QUADRANGLE.**

**Pendleton along Oregon-Washington Railroad & Navigation Co.'s track to Huntington (portion of line).**

Bingham Springs, in front of station; base of rail-----	1,748.20
Bingham Springs, 158 feet east of corner of station, 36 feet north of center of track, 45 feet east of road crossing, 4 feet east of first telegraph pole from station; iron post stamped "1744 A"-----	1,749.070
Milepost 258, 0.5 mile east of, 22 feet south of track, 35 feet east of whistling post; iron post stamped "2023 A"-----	2,027.621
Wilbur, in front of section house; base of rail-----	2,270.25
Wilbur, 150 feet east of section house, at corner of fence near telegraph office, 32 feet south of center of track; iron post stamped "2204 A"-----	2,269.147
Bridge 115, 540 feet east of east end of, 30 feet south of center of track, 5 feet east of telegraph pole; iron post stamped "2570 A"-----	2,575.541
Huron, 300 feet west of signboard, 30 feet south of center of track, 45 feet west of tool house, 85 feet east of water tank; iron post stamped "2906 A"-----	2,912.262
Milepost 278, 12 feet east of, 15 feet south of center of track; iron post stamped "3454 A"-----	3,460.398
Meacham, 5 feet west of west end of platform, 15 feet north of center of track, 2 feet south of fence around log cabin eating house; iron post stamped "3672 A"-----	3,679.114

**LA GRANDE QUADRANGLE.**

**Pendleton along Oregon-Washington Railroad & Navigation Co.'s track to Huntington (portion of line).**

Milepost 284, 30 feet southwest of, 24 feet south of center of track; iron post stamped "3958 A"-----	3,965.008
Kamela, 1.5 feet south of platform, 44 feet east of northeast corner of telegraph office, 1.5 feet west of west corner of tank building, 14 feet south of center of track; iron post stamped "4199 A"-----	4,205.782
Milepost 292, 120 feet east of, 18 feet south of center of track; iron post stamped "3581 A"-----	3,588.022

Hilgard, 2 feet west of first telegraph pole west of station, 24 feet north of center of track; iron post stamped "3001 A"-----	Feet 3,007.164
Perry, 2 feet east of east end of office of Grande Ronde Co., 45 feet north of center of track; iron post stamped "2897 A"-----	2,902.586
La Grande, in front of telegraph office; top of rail-----	2,784.1
La Grande, 165 feet northeast of First Street crossing, 30 feet north of northwest corner of railroad tool house, 24 feet west of telegraph pole; iron post stamped "2773 A"-----	2,778.908
La Grande, corner of Chestnut Street and Adams Avenue, in third course of plaster facing brick wall on Chestnut Street side of Foley Hotel; aluminum tablet stamped "2782 A"-----	2,787.345

## TELOCASET QUADRANGLE.

Pendleton along Oregon-Washington Railroad & Navigation Co.'s track to Huntington (portion of line).

Milepost 311, 3,600 feet east of, 50 feet south of center of track, 1 foot north of fence; iron post stamped "2696 A"-----	2,701.388
Hot Lake, base of south rail-----	2,700.72
Milepost 317, 55 feet northeast of, 5 feet west of telegraph pole, 7 feet south of fence; iron post stamped "2705 A"-----	2,710.900
Union, in front of station; top of rail-----	2,716.36
Union, 1,000 feet west of second snowshed east of, 15 feet south of track, 4 feet west of fence of cattle guard; iron post stamped "3021 A"-----	3,026.646
Telocaset, base of rail opposite telegraph office-----	3,447.03
Telocaset, 3 feet east of east corner of fence at section house, 18 feet north of center of track; iron post stamped "3440 A"-----	3,446.114
Milepost 332, 0.5 mile south of, 180 feet north of north portal of tunnel 5, 14 feet east of track; iron post stamped "3228 A"-----	3,234.837
North Powder, base of rail opposite telegraph office-----	3,241.93
North Powder, 120 feet southwest of station, 32 feet south of center of track, at northeast corner of fence, 15 feet south of wagon road; iron post stamped "3235 A"-----	3,241.635

## BAKER CITY QUADRANGLE.

Pendleton, along Oregon-Washington Railroad & Navigation Co.'s track, to Huntington (portion of line).

Milepost 342, 28 feet north of, 42 feet north of center of track; iron post stamped "3372 A"-----	3,379.115
Haines, 0.5 mile south of, 45 feet east of track, in stone masonry; bronze tablet stamped "3322 A"-----	3,323.800
Wingville, 1.5 miles north of, 65 feet west of track, 600 feet east of Jennings's house on main road between Haines and Baker City; iron post stamped "3338 A"-----	3,345.528
Baker City, astronomical pier, in front yard of public school; bronze tablet stamped "3433 A"-----	3,440.260
Norton siding, 150 feet north of section house; iron post stamped "3646 A"-----	3,653.656
Norton siding; top of rail-----	3,651.8
Encina, in front of station; top of rail-----	3,964.3
Pleasant Valley, in front of station; top of rail-----	3,824.4

Pleasant Valley, 15 feet south of west corner of railroad building, 50 feet south of station, 99 feet south of track; iron post stamped "3818 A"-----	Feet. 3, 826. 190
Unity, 185 feet north of section house, at forks of road; iron post stamped "3139 A"-----	3, 145. 879
Unity, top of north rail opposite section house-----	3, 130. 0

**CARSON QUADRANGLE.**

Pendleton, along Oregon-Washington Railroad & Navigation Co.'s track, to Huntington (portion of line).

Durkee, 30 feet east of telegraph office, 36 feet north of track, 1 foot west of southwest corner of fence at section house; iron post stamped "2647 A"-----	2, 653. 982
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**BIRCH CREEK QUADRANGLE.**

Pendleton, along Oregon-Washington Railroad & Navigation Co.'s track, to Huntington (portion of line).

Tunnel G, 600 feet west of west end of, 45 feet north of track, 8 feet from east corner of fence; iron post stamped "2369 A"-----	2, 376. 110
Bridge 356, 360 feet south of, 30 feet east of railroad track, 13 feet west of fence; iron post stamped "2215 A"-----	2, 222. 177
Huntington, Washington Street, in sixth row of brick above stone foundation, second row of horizontal bricks, in front of brick building of Oregon Commercial Co., near stairway between grocery and drug store; aluminum tablet stamped "2105 A"-----	2, 112. 593
Huntington, in front of station; top of rail-----	2, 101. 4
Huntington, 2.4 miles east of, 3.5 feet east of west end of steel bridge over Snake River; aluminum tablet stamped "2079 A"-----	2, 085. 724

**Birch Creek, Mitchell Butte, and Weiser Quadrangles.****MALHEUR COUNTY.**

The elevations in the following list are based on bench marks established by C. H. Semper in 1903 at Weiser, Ontario, and Vale, and are stamped with the letter "H." The transcontinental precise level party of the Coast and Geodetic Survey determined the elevation of the Huntington and other bench marks and made a correction of plus 7.5 feet on Semper's line. All the bench marks stamped with the letter "H," in addition to the figures of elevation, are stamped 7 or 8 feet too low.

Bench marks set in 1905 are stamped "ADJ 1903" in addition to figures noting field elevations.

The leveling of 1904 was done by the Reclamation Service and that of 1905 by Messrs. Morrow, Higley, Harris, and Evans of the Geological Survey.

**MITCHELL BUTTE QUADRANGLE.**

Vale via Valley Road to schoolhouse 7 miles west of Vale.

Vale, 3.2 miles southwest of, turn of road at Gillerman place, 0.5 mile north of southwest corner, T. 19 S., R. 44 E., sec. 1; iron post stamped "2268 H"-----	Feet. 2, 275. 388
Vale, 7 miles west of, north side of road directly opposite schoolhouse, on line with east margin of building; iron post stamped "2308 H"-----	2, 315. 656



**Vale southwest along road southwest of Malheur River to Malheur Canyon,  
13.7 miles west of Vale.**

	Feet.
Vale, 3 miles south of, west of road at 3 milepost, 0.3 mile south of Morrigan house; iron post stamped "2270 H"-----	2, 277.514
Vale, 7.3 miles southwest of, 150 feet north of and in line with east side of J. M. Griffin's house; iron post stamped "2293 H"-----	2, 300.720
Vale, 10 miles southwest of, 10 feet south of road, on line with east fence M. Hansen's ranch; iron post stamped "2330 H"-----	2, 337.573
Vale, 13.1 miles southwest of, 15 feet north of road, near point of hill, 0.8 mile from F. M. Vine's place; iron post stamped "2331 H"-----	2, 338.499

**Ontario along road to Owyhee.**

Nyssa, 2 miles south and 2 miles west of, 0.5 mile south of center sec. 6, T. 20 S., R. 47 E.; iron post stamped "2197 H"-----	2, 204.392
Biglows, north side of road opposite; iron post stamped "2236 H"---	2, 224.178
Owyhee, opposite schoolhouse, 15 feet west of telegraph pole; iron post stamped "2236 H"-----	2, 243.429

**Nyssa along road to Ontario.**

Ontario, 10 miles south of, 2 miles west of, in southeast angle of crossroads, by fence post; iron post stamped "2201 H"-----	2, 208.427
Ontario, 5.5 miles south by 2 miles west of, at foot of telegraph pole at W. G. Jenkins's gate; iron post stamped "2177 H"-----	2, 184.550
Ontario, 2 miles south by 2 miles west of, 30 feet west of road in line with south side of schoolhouse; iron post stamped "2175 H"-----	2, 182.483
Ontario, 3.1 miles west of, south of road at corner of wire fence and road to ranch house; iron post stamped "2154 H"-----	2, 161.724

**Griffin ranch, 7.3 miles southwest of Vale, by road west and south to Twin  
Springs.**

Vale, 7.3 miles southwest of, at Griffin ranch, south side of road, 100 feet north of house; iron post stamped "2293"-----	2, 300.720
Griffin ranch, 3 miles southwest of, 10 feet east of road; iron post stamped "2386 ADJ 1903"-----	2, 386.060
Griffin ranch, 6 miles southwest of, 15 feet east of road, 600 feet east of house, near Willow Springs; iron post stamped "2484 ADJ 1903"-----	2, 483.936
Willow Springs, 2.5 miles southwest of, 10 feet east of road, 20 feet east of dry creek bed; iron post stamped "2613 ADJ 1903"-----	2, 613.092
Willow Springs, 5.5 miles southwest of, 25 feet west of road, in rock; aluminum tablet stamped "2834 ADJ 1903"-----	2, 833.557
Willow Springs, 8.5 miles southwest of, 20 feet northwest of road; iron post stamped "3117 ADJ 1903"-----	3, 117.341
Twin Springs, 5.6 miles north of, at intersection of Sagebrush and Vale roads; iron post stamped "3251 ADJ 1903"-----	3, 251.304
Twin Springs, 2.9 miles north of, at intersection of Nyssa and Vale roads; iron post stamped "3357 ADJ 1903"-----	3, 357.172
Twin Springs, 10 feet east of road, 200 feet north of house; iron post stamped "3246 ADJ 1903"-----	3, 246.332

**Intersection of Vale and Sagebrush road near Nigger Rock east and north to Owyhee schoolhouse.**

Intersection of Vale and Sagebrush roads, 6 miles east of, 10 feet south of road; iron post stamped "3316 ADJ 1903"-----	Feet. 3,316.695
Intersection of Vale and Sagebrush roads, 9 miles east of, at west side of road; aluminum tablet stamped "3182 ADJ 1903"-----	3,181.747
Intersection of Vale and Sagebrush roads, 12 miles east of, near creek crossing, 7 feet north of road; iron post stamped "2922 ADJ 1903"-----	2,921.959
Owyhee, 4 miles west of, 15 feet north of road, at summit just north of Mitchell Butte; iron post stamped "2629 ADJ 1903"-----	2,631.123
Owyhee, 1 mile west of, 35 feet north of canal crossing near farmhouse; iron post stamped "2232 ADJ 1903"-----	2,232.556

**Twin Springs to Freezeout Spring.**

Twin Springs, 3 miles southwest of, at top of watershed 10 feet south of road; iron post stamped "3767 ADJ 1903"-----	3,767.371
Freezeout Spring, 250 feet east of, 10 feet south of drain from spring, 35 feet north of road; aluminum tablet stamped "3794 ADJ 1903"-----	3,794.295

**Twin Springs south and east to Board Corral, thence to Muller & Bain ranch and to Owyhee schoolhouse.**

Twin Springs, 2 miles south of, in ledge of rock, 6 feet west of road, 400 feet west of sharp turn in dry creek bed; aluminum tablet stamped "2920 ADJ 1903"-----	2,920.139
Twin Springs, 7.8 miles southeast of, 1,500 feet west of Owyhee River, 10 feet north of road, at foot of boulder strewn slope; aluminum tablet stamped "2497 ADJ 1903"-----	2,497.402
Twin Springs, 11 miles southeast of, 10 feet north of Owyhee River and Board Corral Roads, 800 feet east of river, 150 feet north of dry creek, in large flat rock; aluminum tablet stamped "2559 ADJ 1905"-----	2,559.492
Board Corral, 4.1 miles west of, 15 feet east of dry creek bed, in line with two large peaks, one on each side of creek, in large rock; aluminum tablet stamped "3578 ADJ 1903"-----	3,578.070
Board Corral, 6 feet northeast of shack, 50 feet north of spring, 150 feet north of corral; iron post stamped "4489 ADJ 1903"-----	4,489.674
Board Corral, 3.3 miles south of, 10 feet south of road; iron post stamped "3864 ADJ 1903"-----	3,863.014
Isaacs ranch, 5.6 miles west of, 15 feet east of road, 1,000 feet west of rocky cut; iron post stamped "3747 ADJ 1903"-----	3,747.482
Isaacs ranch, 1.8 miles west of, 200 feet south of creek bed, 30 feet north of road, in rock; aluminum tablet stamped "2740 ADJ 1903"-----	2,740.059
Isaacs ranch, 3 miles north of, 15 feet west of road, 0.25 mile south of where road forks to Alkali Springs, on small divide; iron post stamped "2797 ADJ 1903"-----	2,797.010
Muller & Bain ranch, 4.7 miles south of, 30 feet south of road, at forks of road; iron post stamped "2512 ADJ 1903"-----	2,512.593

Muller & Bain ranch, 1.3 miles south of ranch house, 30 feet south of road, 50 feet south of fence, 400 feet west of irrigation ditch crossing road, on small rise; iron post stamped "2244 ADJ 1903"	Feet. 2, 244.402
Muller & Bain ranch, 1.8 miles north of, 30 feet west of road, 60 feet south of drain, in rock; aluminum tablet stamped "2253 ADJ 1903"	2, 253.747
Owyhee bridge, 3.3 miles south of, 20 feet east of road; iron post stamped "2238 ADJ 1903"	2, 238.850

**Point 4 miles south of Twin Springs up Sand Hollow.**

Twin Springs, 6 miles south of, 10 feet east of road, 200 feet south-east of sand slide in side of hill; iron post stamped "2961 ADJ 1903"	2, 961.712
Twin Springs, 9 miles south of, 10 feet west of road, 80 feet east of dry creek bed, 100 feet north of Saddle Hills; iron post stamped "3186 ADJ 1903"	3, 186.091

**Isaacs ranch east to Homedale.**

Isaacs ranch, 2.7 miles east of, 30 feet south of road, on divide between Sucker Creek and Snake River valleys; iron post stamped "2809 ADJ 1903"	2, 809.277
Homedale, 6.1 miles west of, at Graveyard Point, 30 feet north of road; iron post stamped "2416 ADJ 1903"	2, 416.696

**Owyhee schoolhouse northwest to Vale.**

Owyhee schoolhouse, 3.1 miles north of, 40 feet west of road, in rock; aluminum tablet stamped "2244 ADJ 1903"	2, 343.542
Owyhee schoolhouse, 6.2 miles north of, 30 feet east of road, in rock; aluminum tablet stamped "2516 ADJ 1903"	2, 516.247
Vale, 7.4 miles south of, 30 feet west of road, on summit; iron post stamped "2909 ADJ 1903"	2, 909.144
Vale, 4.5 miles south of, 30 feet south of road to Nyssa, 20 feet east of main road; iron post stamped "2544 ADJ 1903"	2, 544.502

**Point 4 miles southwest of Griffin ranch up Sand Hollow.**

Intersection of Red Butte and Vale Road, 2.6 miles west of, on Sand Hollow Road at forks of two roads, 300 feet southwest of sand bank; aluminum tablet stamped "2471 ADJ 1903"	2, 470.862
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**Point 8 miles north and east of intersection of Vale and Sagebrush Road south toward Grassy Mountain.**

Intersection of Nigger Rock and Owyhee Road, 2.1 miles south of, on small rise 500 feet north of deep gulch, 300 feet northwest of round knoll, 20 feet west of road, in rock; aluminum tablet stamped "2711 ADJ 1903"	2, 710.781
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**BIRCH CREEK QUADRANGLE.**

**Vale along road up west side of Willow Creek to Coles.**

Vale, 3.6 miles north of, 10 feet west of road, in line with Mitchell house; iron post stamped "2278 H"	2, 285.369
Vale, 7 miles north of, 10 feet west of road, 1,000 feet northeast of Harris house; iron post stamped "2310 H"	2, 317.578

Vale, 10.5 miles north of, midway between schoolhouse and Faulkner place; iron post stamped "2343 H"-----	Feet. 2, 350. 532
Vale, 14 miles north of, 15 feet west of road, 0.3 mile south of Scott house; iron post stamped "2398 H"-----	2, 405. 531
Vale, 17.5 miles north of, 10 feet west of road, 500 feet south of drain to J. Norwood's house; iron post stamped "2490 H"-----	2, 497. 488
Vale, 21 miles north of, 15 feet west of road, 300 feet north of spring; iron post stamped "2508 H"-----	2, 515. 459
Vale, 24.5 miles north of, 10 feet east of road at fence; iron post stamped "2592 H"-----	2, 599. 005

**WEISER QUADRANGLE.****At Ontario.**

Ontario, corner of Main Street and road to station, 12 feet east of northeast corner of Brown's hotel (Carko House); iron post stamped "2143 H"-----	2, 150. 773
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**Ontario north along road via Mesquite to Weiser.<sup>1</sup>**

Ontario, 4.1 miles north of, west angle of forks of road where road turns up gulch; iron post stamped "2145 H"-----	2, 152. 864
Ontario, 6.7 miles north of, northeast corner of Rockfellow's fruit orchard, 9 feet from corner, in line with east and west fence, 25 feet west of road; iron post stamped "2133 H"-----	2, 139. 605
Ontario, 9.7 miles north of, 400 feet west of Applegate's house, 70 feet from corner near canal; iron post stamped "2124 H"-----	2, 131. 532
Weiser, 6.5 miles south of, Mesquite, in small gulch, which road follows to Mesquite Flat, 15 feet west of road; iron post stamped "2132 H"-----	2, 139. 370
Weiser, 2 miles south of, 0.25 mile south of M. A. Patch's house, at bottom of hill; iron post stamped "2104 H"-----	2, 111. 362
Weiser station, 30 feet east of main track; iron post stamped "2107 H"-----	2, 114. 283

**Baker City, Sumpter, and Susanville Quadrangles.****BAKER, GRANT, AND UNION COUNTIES.**

The elevations in the following list are based upon preliminary adjustments by the transcontinental precise level party of the Coast and Geodetic Survey, which connected with bench marks of the Geological Survey along the Oregon-Washington Railroad & Navigation Co.'s track. A part of the leveling in the Baker City and Sumpter quadrangles was previously reported in the appendix to the Twenty-first Annual Report of the United States Geological Survey and a part in Bulletin 185. The elevations in both publications are from 7 to 9 feet too low. (For other elevations in the Baker City quadrangle, see line from Astoria to Huntington.)

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<sup>1</sup> The error in this line is excessive.

Most of the leveling was done in 1898-99 by W. R. Manning. Some work was done in Sumpter quadrangle in 1900 by C. L. Nelson, in the Baker City quadrangle by C. H. Semper in 1904, and in the Susanville quadrangle by Homer Hadley in 1905.

Elevation figures on the standard bench marks stamped "B. C." are generally 6 feet high, and figures on later bench marks stamped "A" are generally about 8 feet low.

#### BAKER CITY QUADRANGLE.

**Baker City west along county road to Pocahontas, thence north to schoolhouse 1 mile north of Haines, and return to Baker City via Flagstaff Well.**

	Feet.
Baker City, in yard and at east side of brick public schoolhouse, in top of small masonry pier; bronze tablet stamped "3433 A"-----	3,440.280
T. 9 S., R. 39 E., sec. 6, 300 feet west of Pocahontas schoolhouse, south of road, opposite fork of road to north; iron post stamped "3673 B C"-----	3,666.375
T. 8 S., R. 39 E., NW. $\frac{1}{4}$ sec. 4, 1 mile south of Haines, 20 feet southeast of Olson house; iron post stamped "3342 B C"-----	3,335.928
T. 8 S., R. 39 E., sec. 3, 1.2 miles southeast of Haines, east of railroad track, in stone masonry of North Base triangulation station; bronze tablet stamped "3335"-----	3,328.855
Haines, Oregon-Washington Railroad & Navigation Co.'s station, in front of; top of rail-----	3,333.6
T. 7 S., R. 39 E., NW. $\frac{1}{4}$ sec. 28, 70 feet northeast of Richman house, west of road; iron post stamped "3334 B C"-----	3,327.708
T. 8 S., R. 39 E., sec. 23, 1 mile north by 1 mile east of Wingville, 65 feet west of Oregon-Washington Railroad & Navigation Co.'s track, 600 feet east of Jennings house; iron post stamped "3352 B C"-----	3,345.528
T. 9 S., R. 40 E., NE $\frac{1}{4}$ sec. 1, 1.2 miles northwest of Flagstaff mine, at northeast angle of forks of road; iron post stamped "3495 B C"-----	3,488.599

#### Haines west to Rock Creek schoolhouse.

T. 7 S., R. 38 E., 750 feet northwest of southeast corner of sec. 36, 150 feet southwest of Rock Creek schoolhouse, 250 feet west of road; iron post stamped "3446 A"-----	3,450.411
T. 8 S., R. 38 E., 200 feet south by 20 feet west of northeast corner of sec. 1, south of Rock Creek schoolhouse; iron post stamped "3443"-----	3,453.343

**Haines along county road via Slough house to schoolhouse 4.5 miles north of Baker City.**

T. 7 S., R. 40 E., sec. 31, 2 miles northwest of Slough house, in east angle of forks of road; iron post stamped "3351 B C"-----	3,344.630
T. 8 S., R. 40 E., sec. 9, 0.7 mile southeast of Slough house, 100 feet east of Clark house; iron post stamped "3344 B C"-----	3,337.803

**Flagstaff Well northeast to P. H. Miles's house, thence southeast to Keating and return, thence southwest to Palmer house, thence west to Flagstaff Well.**

T. 8 S., R. 41 E., NE. $\frac{1}{4}$ sec. 7, northwest of road, 600 feet southwest of steep grade; iron post stamped "3553 BC"-----	Feet. 3,547.241
T. 7 S., R. 41 E., near center sec. 35, 15 feet northeast of Emily schoolhouse, 80 feet southwest of road; iron post stamped "2788 BC"-----	2,781.835
Keating, T. 8 S., R. 42 E., east side of sec. 26, 50 feet south of corner of house, in post-office yard at corner of fence; iron post stamped "2695 BC"-----	2,689.857
T. 9 S., R. 42 E., sec. 27, 50 feet northwest of Palmer house, south of road near milepost 13; iron post stamped "3097 BC"-----	3,091.938
T. 9 S., R. 41 E., sec. 10, northwest angle of forks of roads; iron post stamped "3341 BC"-----	3,336.318

**Miles's house north to Beagle Creek, thence southeast via Burkemont to Keating.**

T. 6 S., R. 41 E., SW. $\frac{1}{4}$ sec. 35, 0.2 mile west of Beagle Creek, east side of road, 125 feet north of right angle in road; iron post stamped "3191 BC"-----	3,185.519
T. 7 S., R. 42 E., east side of sec. 29, 1 mile south of Table Mountain, top of rocky hill between forks of roads to Table Mountain, 0.2 mile north of road to Burkemont; aluminum tablet stamped "3452 BC"-----	3,447.000

**Point near White Swan mine south via Pritchard Flat and Pritchard Creek to Unity.**

T. 10 S., R. 43 E., NW. $\frac{1}{4}$ sec. 7, on top of bare ridge, 1.7 miles north of house on west side of Pritchard Creek, 0.2 mile west of north-south road, south of dim road east and west; iron post stamped "3917 BC"-----	3,914.028
Unity, in front of station; top of rail-----	3,128.5
Unity, sec. 1, T. 11 S., R. 42 E., 180 feet north of section house, east of main road, in forks; iron post stamped "3139 A"-----	3,145.879

**Unity southeast to Burnt River valley, thence west to mouth of Cave Creek, thence north via Deer Creek and Sheep Flat to Pleasant Valley.**

T. 11 S., R. 42 E., NE. $\frac{1}{4}$ sec. 22, 2.5 miles northwest of Powell stone house, east of wood road, top of sandstone in place 18 by 15 feet and 3 feet out of ground; aluminum tablet stamped "3912 BC"-----	3,907.910
T. 12 S., R. 42 E., NE. $\frac{1}{4}$ sec. 6, 300 feet south of Lander house, south angle of forks of road at mouth of Cave Creek; iron post stamped "3126 BC"-----	3,120.786
T. 11 S., R. 41 E., NW. $\frac{1}{4}$ sec. 21, above headwaters of Deer Creek, on flat summit of divide 5 feet west of road; iron post stamped "5257 BC"-----	5,251.444

**Baker City southwest via Bowen ranch and Lockhart station to Whipple Gulch.**

T. 9 S., R. 40 E., south side sec. 32, 400 feet southwest of Bowen house, in forks of road; iron post stamped "3519 BC"-----	3,512.574
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T. 10 S., R. 39 E., north side of sec. 22, 1.3 miles southeast of Auburn, 175 feet south of junction of Prairie City and Hereford roads, on east side of Hereford road and east of white house owned by Mr. Littlefield; iron post stamped "3915 BC"-----	Feet. 3,908.320
Lockhart station, on Sumpter Valley Railway; top of rail-----	3,717.3
T. 11 S., R. 39 E., north side of sec. 18, main divide between Powder River and Burnt River, 30 feet west of road, summit of road between Baker City and Hereford; iron post stamped "5669 BC"-----	5,662.791

Hereford east along county road down Burnt River to Bridgeport, thence north to Bowen.

T. 12 S., R. 40 E., sec. 29, 0.3 mile east of Mill Creek, 10 feet north of road and 75 feet west of dry drain; iron post stamped "3499 BC"-----	3,492.872
T. 11 S., R. 40 E., sec. 28, divide between Burnt River and Powder River, main summit of road between Baker City and Bridgeport, 10 feet west of road and 160 feet north of junction with dim road running southwest; iron post stamped "6127 BC"-----	6,120.722

#### CAVINESS QUADRANGLE.

Bench mark in sec. 27, T. 12 S., R. 39 E.

T. 12 S., R. 39 E., sec. 27, 30 feet south of road, 80 feet west of house owned by T. M. Reed, in corner of fence; iron post stamped "3559 BC"-----	3,552.711
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#### SUMPTER QUADRANGLE.

Whipple Gulch south to Hereford.

T. 11 S., R. 38 E., north side of sec. 26, 150 feet northwest of mouth of Whipple Gulch, 50 feet west of road; iron post stamped "4457 BC"-----	4,450.911
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California Gulch west via Sumpter Valley Railway to McEwen.

McEwen, in front of station; top of rail-----	4,105.5
McEwen, SE. $\frac{1}{4}$ sec. 12, T. 10 S., R. 37 E., 0.6 mile west of post office, north of road, at fork of road to Prairie City; iron post stamped "4168 BC"-----	4,161.664

McEwen southwest to burnt cabin 3 miles east of Clifford, thence southeast to Hereford.

T. 10 S., R. 37 E., NE. $\frac{1}{4}$ sec. 16, 1 mile southwest of Young house, 20 feet north and 10 feet east of road to Sumpter; iron post stamped "4356 BC"-----	4,349.742
T. 11 S., R. 36 E., south side sec. 12, 2.8 miles southeast of Trout Creek, 40 feet north and 15 feet east of summit of road, in top of flat boulder; bronze tablet stamped "4691 A"-----	4,698.133
T. 11 S., R. 37 E., sec. 30, 0.5 mile north of King house, 12 feet north-east of road, in boulder; copper bolt stamped "3946 A"-----	3,953.763
T. 12 S., R. 37 E., SE. $\frac{1}{4}$ sec. 5, 175 feet southeast of Hardman house, 25 feet south of gate, at road side; iron post stamped "3908 A"-----	3,915.561

**McEwen northwest via Sumpter to Granite.**

Sumpter, south side of sec. 29, T. 9 S., R. 37 E., 45 feet north of north-east corner of station; iron post stamped "4420 BC"-----	Feet. 4, 422. 886
T. 9 S., R. 36 E., SE. $\frac{1}{4}$ sec. 22, 1,000 feet east of saloon, 10 feet north-east and 6 feet above road, in bowlder; tablet stamped "5325 A"---	5, 332. 634
Granite, east side of sec. 4, T. 9 N., R. 35 $\frac{1}{2}$ E., north side of Grand Hotel, 10 feet west of corner of steps; iron post stamped "4680 A"---	4, 687. 694

**Granite south via Red Boy mine to Robinsonville, thence east to Clifford.**

T. 9 S., R. 35 E., SW. $\frac{1}{4}$ sec. 11, Red Boy mine, 450 feet northeast of stamp mill, 20 feet southwest of west end of Clear Creek bridge, 20 feet south of road; iron post stamped "4610 A"-----	4, 617. 728
Robinsonville, 0.2 mile south of post office, sec. 10, T. 10 S., R. 35 E., 25 feet south of road at summit, in top of rock 4 inches above ground; tablet stamped "6249 A"-----	6, 256. 492
Geiser, sec. 10, T. 10 S., R. 35 $\frac{1}{2}$ E., 450 feet west of Bonanza mill concentrator, north of road; iron post stamped "5140 A"-----	5, 147. 740
Clifford, T. 10 S., R. 36 E., sec. 19, 100 feet north of house, 2 feet east of Bonanza road, in top of bowlder; bronze tablet stamped "4269 A"-----	4, 278. 239

**Granite north via Crane Flats to Trout Creek Meadows and to Chicken Hill.**

T. 8 S., R. 35 $\frac{1}{2}$ E., sec. 15, 8 feet west of summit of road, north of Lucas Gulch, on Crane Flats, 15 feet north of fork of road to Monumental mine; iron post stamped "5606 A"-----	5, 673. 947
T. 7 S., R. 35 $\frac{1}{2}$ E., east side of sec. 34, 20 feet northeast of bridge over North Fork of John Day River, at north edge of Crane Flats, 10 feet east of road; iron post stamped "5195 A"-----	5, 202. 751
Chicken Hill, SW. $\frac{1}{4}$ sec. 1, T. 7 S., R. 35 $\frac{1}{2}$ E., on county line, 10 feet west of road, 75 feet northeast of sheep corral; iron post stamped "5929 A"-----	5, 936. 895
T. 7 S., R. 35 E., east side sec. 24, Trout Creek meadow, 60 feet southeast of log house, 200 feet south of east fork of Trout Creek, 2 miles west of Pendleton road; iron post stamped "5401 A"-----	5, 408. 784

**North Fork of John Day River on spur east from Crane Flats.**

T. 7 S., R. 36 E., sec. 32, North Fork of John Day River, 4 miles east of bridge over, 30 feet northeast of ford, 5 feet southeast of road; iron post stamped "5497 A"-----	5, 504. 721
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**Crane Flats east to Monumental mine (spur line).**

Monumental mine, sec. 19 (unsurveyed), T. 8 S., R. 36 E., 50 feet northeast of hotel; iron post stamped "6352 A"-----	6, 359. 833
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**Lawton north to Saunder's mill (spur line).**

T. 8 S., R. 35 E., east side of sec. 35, 1 mile northwest of Lawton, 50 feet east of bridge over Three Cent Creek, 250 feet southeast of Saunder's mill; iron post stamped "4443 A"-----	4, 450. 793
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**Sumpter north to Bourne.**

T. 9 S., R. 37 E., sec. 5 (unsurveyed), 50 feet northeast of Scarf's house, 15 feet north of Silver Creek road, in granite rock; aluminum tablet stamped "5013 BC"-----	Feet. 5,006.661
Bourne, east side of sec. 32 (unsurveyed), T. 8 S., R. 37 E., 65 feet northeast of J. P. Fox's house, 20 feet west of Eureka and Excelsior mine; iron post stamped "5403 BC"-----	5,396.518

**Clifford southwest to Austin, thence east to Hereford.**

T. 10 S., R. 35½ E., sw. ¼ sec. 26, 250 yards west of bridge over North Fork of Burnt River, in top of large boulder; aluminum tablet stamped "4368 A"-----	4,377.103
T. 10 S., R. 35½ E., west side of sec. 34, 12 feet northwest of road, at southwest corner of small flat on summit, in top of large boulder; bronze tablet stamped "5107 A"-----	5,114.252
Austin, west side of sec. 21, T. 11 S., R. 35 E., 30 feet west of store, 20 feet west of road, in top of large boulder; aluminum tablet stamped "4074 A"-----	4,081.247
T. 11 S., R. 35½ E., sec. 34 (unsurveyed), 450 feet east of log house, 100 feet east of new log barn, 50 feet south of road, in top of large boulder; copper bolt stamped "4324 A"-----	4,332.847

**SUSANVILLE QUADRANGLE.****Austin via Susanville to Pendleton Road near Long Creek (unchecked spur line).**

T. 11 S., R. 35 E., west side of sec. 21, 30 feet west of store, 20 feet west of road, in top of boulder; aluminum tablet stamped "4074 A"-----	4,081.247
Austin, 3.2 miles west of, 800 feet north of Finland ranch house, 120 feet north of road, in highest surface of; aluminum tablet stamped "4032 ADJ 1903"-----	4,032.361
Austin, 5.2 miles west of, on summit of first divide west of Finland ranch, 20 feet north of road, highest point on set rock; "U. S. G. S. 4099" painted on rocks-----	4,099.22
Austin, 6.2 miles west of, on hillside 800 feet northwest of bridge over Boulder Creek, 30 feet east of road, highest surface of set boulder; aluminum tablet stamped "4109 ADJ 1903"-----	4,108.625
Thompson ranch, 1.1 miles west of, on north edge of road, in large rock; aluminum tablet stamped "3946 ADJ 1903"-----	3,945.555
Thompson ranch, 2 miles west of, at bend in road, 10 feet south of road, 75 feet north of Middle Fork of John Day River, in large set boulder; aluminum tablet stamped "3666 ADJ 1903"-----	3,665.524
Ballancis ranch, 1.1 miles east of, 750 feet northeast of small log cabin, with extension roof, 25 feet north and about 15 feet above road, in large boulder; aluminum tablet stamped "3566 ADJ 1903"-----	3,566.024
Susanville, at north corner of Badger Mining Co.'s stamp mill, highest face of large serpentine boulder; aluminum tablet stamped "3765 ADJ 1903"-----	3,764.906
Mouth of Camp Creek, 1.1 miles above, 50 feet south of fence, 30 feet east of wagon trail; iron post stamped "3559 ADJ 1903"-----	3,558.542
Mouth of Camp Creek, 4.3 miles above, 100 feet above point where wagon trail crosses creek, 75 feet east of creek, 10 feet east of wagon road, 5 feet north of small spring, in large rock; aluminum tablet stamped "3854 ADJ 1903"-----	3,854.060

Galena, at east corner of hotel, 10 feet southeast of main street; iron post stamped "3410 ADJ 1903"-----	Feet. 3,409.793
Griggs ranch house, 0.6 mile east of, 900 feet east of bridge over river, 200 feet northwest of Little Mosquito Creek, 25 feet north of road, highest surface of set rock; aluminum tablet stamped "3340 ADJ 1903"-----	3,339.752
John Day River, bridge over Middle Fork of, on top of iron bridge, bolt over center pier and on south side of bridge; "3326" painted on bridge timber-----	3,326.235
McMahon ranch, 0.8 mile east of, on summit of first divide west of Griggs ranch, 300 feet north of road, large upright rock; aluminum tablet stamped "3765 ADJ 1903"-----	3,764.992
Cross Hollow Creek, 800 feet west of, summit of first hill, 30 feet north of old stone fence, 20 feet west of road, in large rock; aluminum tablet stamped "3669 ADJ 1903"-----	3,669.014
Slide Creek, 1.2 miles east of, on summit of first hill east of creek, 10 feet south of road, highest point of set rock; "U.S.G.S. 3644" painted on rock-----	3,644.313
King ranch house, 500 feet southeast of, 30 feet southwest of road, 5 feet northwest of small stream, highest surface of flat rock; aluminum tablet stamped "3550 ADJ 1903"-----	3,549.862
Woodall ranch, 50 feet in front of ranch house, on north edge of road, 6-inch spike in base of large stump; "U.S.G.S. 3347.6" painted on stump-----	3,847.600
Middle Fork and Long Creek valleys, summit between, 60 feet north of road, inside of fence, highest part of set rock; aluminum tablet stamped "4314 ADJ 1903"-----	4,313.508
Forks of Pendleton and Susanville Roads, bow in fence, 20 feet east of guide post; iron post stamped "3814 ADJ 1903"-----	3,814.067

## Ironsides Quadrangle.

## BAKER AND MALHEUR COUNTIES.

The elevations in the following list are based on a bronze tablet stamped "3433 A," set in the astronomical pier in front yard of the public school at Baker City. The elevation of this bench mark is accepted as 3,440.260 feet, as determined by the precise line of levels run along the Oregon-Washington Railroad & Navigation Co. track by the Coast and Geodetic Survey.

The leveling was done in 1905 by Stuart T. Penick and Homer D. Hadley.

## IRONSIDES QUADRANGLE.

Hereford southwest via Unity Road to point about 2 miles from Unity, thence south and east along Ironsides Road to Moore ranch, thence southwest along Military Road to Little Malheur River, thence south and east along road to Hunter ranch.

T. 12 S., R. 37 E., sec. 30, 300 feet southwest of McCullough cabin, 150 feet west of road, 15 feet west of ditch, in top of bowlder; aluminum tablet stamped "3951 A"-----	Feet. 3,960.400
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Hereford, 60 feet southeast of post office, 75 feet east of road and 150 feet north of Trimble house; iron post stamped "3664 BC"-----	Feet. 3, 657. 741
Hereford, 3 miles west of, 700 feet east of Camp Creek, 170 feet north of Merrick Hough's house, 25 feet north of road; iron post stamped "3703 ADJ 1903"-----	3, 702. 867
Hereford, 6 miles west of, 150 feet south of drain, 10 feet north of road on summit of small hill; iron post stamped "3936 ADJ 1903"-----	3, 935. 851
Hereford, 8.75 miles southwest of, 30 feet south of junction of Hereford-Unity Road and Hereford-Ironside Road; iron post stamped "3936 ADJ 1903"-----	3, 935. 985
Hereford, 12 miles southwest of, 800 feet north of road forks, 250 feet west of fence, 6 feet northeast of road on small rise; iron post stamped "4142 ADJ 1903"-----	4, 142. 017
Beams ranch, 7.8 miles northwest of, 8 feet west of road on summit of hill; iron post stamped "4640 ADJ 1903"-----	4, 640. 902
Beams ranch, 3.5 miles northwest of, 75 feet south of Eldorado Ditch, 10 feet east of road; iron post stamped "4662 ADJ 1903"-----	4, 662. 916
Beams ranch, 0.5 mile north of, 200 feet southeast of clump of quaking aspen, 15 feet north of road; iron post stamped "4123 ADJ 1903"-----	4, 123. 745
Moore ranch, 0.25 mile southeast of, 200 feet west of Willow Creek, at west end of lane, 20 feet southwest of road; iron post stamped "3987 ADJ 1903"-----	3, 987. 777
Board cabin, 0.25 mile southwest of, 800 feet southwest of field, 200 feet northwest of Willow Creek, 15 feet northwest of road; iron post stamped "4196 ADJ 1903"-----	4, 197. 070
Cobin ranch, 2.25 miles southwest of, 300 feet northwest of Willow Creek, 10 feet southeast of road, at northeast corner of Cobin ranch upper pasture; iron post stamped "4452 ADJ 1903"-----	4, 453. 104
Cobin ranch, 5.25 miles southwest of, 600 feet southwest of creek forks, 30 feet north of creek, 4 feet north of road; iron post stamped "4844 ADJ 1903"-----	4, 844. 939
Tureman ranch, 0.75 mile east of, 100 feet north of creek, 6 feet north of road, in large rock; aluminum tablet stamped "4715 ADJ 1903"-----	4, 715. 761
Tureman ranch, 2 miles southwest of, 0.5 mile southeast of Little Malheur River, 10 feet southeast of road; iron post stamped "4589 ADJ 1903"-----	4, 589. 889
Tureman old ranch, 2.6 miles south of, 900 feet north of rail corral, 300 feet east of Little Malheur River, 20 feet east of road; iron post stamped "4348 ADJ 1903"-----	4, 349. 019
Hunter ranch, 8.5 miles north of, 10 feet northeast of road, on summit of divide between Lost Creek and Bully Creek; iron post stamped "5573 ADJ 1903"-----	5, 574. 013
Hunter ranch, 5.5 miles north of, 300 feet north of where road crosses small drain, 20 feet east of road; iron post stamped "5126 ADJ 1903"-----	5, 126. 969
Hunter ranch, 2.5 miles north of, 20 feet west of road at foot of rocky ridge; aluminum tablet stamped "4268 ADJ 1903"-----	4, 268. 888
Billy Wilson's, 1.5 miles west of, northwest angle of road to J. S. Hunter's house at fence line; iron post stamped "4103 ADJ 1903"-----	4, 110. 053

Hereford southwest along road to point on Unity-Ironside Road 5.5 miles south-east of Unity.

Hereford, 4 miles south of, 150 feet north of road forks, 10 feet west of road, on summit of divide; iron post stamped "4357 ADJ 1903" - 4,356.821 Feet.

Hereford, 7 miles south of, 1 mile east of Murray ranch, 10 feet east of road on summit of divide; iron post stamped "4346 ADJ 1903" - 4,345.935

Hereford-Unity Road 6 miles southwest of Hereford west to Whitehead ranch, thence up Eldorado Ditch Valley to West Camp Creek and down West Camp Creek Valley to Hereford-Unity road.

McGlennan & McCarthy ranch, south side of lane, 1 foot north of fence, 400 feet southwest of house; iron post stamped "3851 ADJ 1903" - 3,850.747

Royal schoolhouse, 1.2 miles southwest of, on South Fork Valley Road, on slight rise in hillside, 20 feet west of road; iron post stamped "3000 ADJ 1903" - 3,999.113

Carlyle ranch, 150 feet southeast of, 100 feet south of bend in road, 1 foot east of fence; iron post stamped "4086 ADJ 1903" - 4,085.859

Hardman ranch, 750 feet southeast of house, 15 feet south of county road; iron post stamped "4321 ADJ 1903" - 4,320.632

At forks of canyon at South Fork of Burnt River, 40 feet east of abandoned log stable; iron post stamped "4494 ADJ 1903" - 4,494.171

Hardman ranch, 3 miles south of, 30 feet south of Eldorado Ditch, on northwest slope of Bull Run Mountain, in large open clearing, 50 feet southwest of small sluice box of old placer mine; iron post stamped "4986 ADJ 1903" - 4,985.646

East Bull Run Mountain, 350 feet west of Job's Creek, 50 feet south of Eldorado ditch on north slope; iron post stamped "4963 ADJ 1903" - 4,962.850

Tureman old ranch west along The Dalles military road to point 0.9 mile west of Crane Prairie, thence south along Drewsey road to Altnow ranch.

Bear Creek Valley, on hillside 400 feet south of Bear Creek, 60 feet east of road, in set rock; aluminum tablet stamped "5073 ADJ 1903" - 5,074.165

Bear Creek, 3.30 miles west of North Fork of Malheur River, 50 feet northwest of road, in boulder; aluminum tablet stamped "4814 ADJ 1903" - 4,814.545

North Fork of Malheur River, 1,000 feet east of, at road crossing, 100 feet southeast of first summit east of river, 5 feet west of road, in mass of rock; aluminum tablet stamped "4721 ADJ 1903" - 4,721.531

Crane Creek Valley, 2.60 miles above junction with North Fork of Malheur River, 60 feet north of creek, 10 feet north of road, in highest surface of rock; aluminum tablet stamped "4771 ADJ 1903" - 4,772.244

Crane Creek Valley, 1,200 feet below Crane Prairie, 60 feet east of creek, 3 feet south of road, in highest part of boulder; aluminum tablet stamped "5213 ADJ 1903" - 5,214.441

Crane Prairie, 0.65 mile south of, 0.7 mile north of summit between Crane Prairie and Cottonwood Creek valley, 10 feet west of road; iron post stamped "5423 ADJ 1903" - 5,424.158

Att's sawmill, 2.55 miles northwest of, 0.30 mile southeast of bare ridge, 15 feet west of road; iron post stamped "5518 ADJ 1903" - 5,518.551

Att's sawmill, 150 feet southwest of, 50 feet south of Alder Creek, 25 feet west of road, in highest surface of large flat-topped bowlder; aluminum tablet stamped "5570 ADJ 1903"-----	Feet. 5,570.621
Antelope Springs, 2.72 miles north of, in open clearing free from sagebrush 15 feet west of road; iron post stamped "5441 ADJ 1903"-----	5,442.001
Antelope Springs, 0.71 mile south of, on summit of first divide south of springs, 100 feet east of road, in rock; aluminum tablet stamped "5490 ADJ 1903"-----	5,500.153
Head Spring of Squaw Creek, 0.7 mile north of, 20 feet west of road, in rock; aluminum tablet stamped "4680 ADJ 1903"-----	4,680.649
Brittingham ranch, 1.25 miles north of, 500 feet east of summit of small flat-topped lava-capped hill, 15 feet east of east fork of Drewsey road, in bowlder; aluminum tablet stamped "3958 ADJ 1903"-----	3,959.231
Beulah, 8.6 miles west of, north side of road, 25 feet west of gate leading to Altnow ranch house, at fence line; iron post stamped "3912 H"-----	3,619.075
Point 2.6 miles south of Tureman old ranch down Little Malheur River to mouth of Lost Creek.	
Little Malheur River Valley, 2.61 miles north of mouth of Lost Creek, 150 feet west of river, 10 feet east of wagon trail, in bowlder; aluminum tablet stamped "4199 ADJ 1903"-----	4,200.245
Junction of Little Malheur River and Lost Creek, 300 feet north-east of, 200 feet southwest of wagon road; iron post stamped "4051 ADJ 1903"-----	4,052.304

## Telocaset Quadrangle.

## UNION AND WALLOWA COUNTIES.

These elevations are based on the results of precise leveling of the Coast and Geodetic Survey in this locality from the preliminary adjustment of 1905.

The leveling was done in 1905 by Homer L. Hadley.

## TELOCASET QUADRANGLE.

Union to North Powder.<sup>1</sup>

Union, Main Street crossing of railroad track, in stone sill of dry-goods store, north of building, 0.6 meter from northeast corner; red metal disk (Coast and Geodetic Survey bench mark Z-2)-----	Feet. 2,788.629
Union, at southeast corner of foundation of Masonic Temple; bronze tablet stamped "2788"-----	2,788.121
Union, Oregon-Washington Railroad & Navigation Co. station, in front of station; top of rail-----	2,716.364
Union, 0.8 mile north of station, 80 feet north of milepost 317, 50 feet east of track; iron post stamped "2711"-----	2,710.960
(This bench mark has been disturbed. The cap was found hampered in in the middle and a hole was punched through the cap, apparently with the sharp end of a crowbar.)	
Hot Lake, north end of station; top of rail-----	2,700.7

<sup>1</sup> This line failed to close at North Powder by -2.674 feet. No adjustment of this error has been made.

Hot Lake, 2.8 miles west of, 15 feet south of junction of La Grande, North Powder, and Hot Lake roads, on east edge of La Grande-North Powder road; inner post stamped "2785 ADJ 1903"-----	Feet. 2, 785. 196
Wendt ranch, 300 feet east of ranch house, 20 feet north of bridge over small creek, 15 feet northeast of road; iron post stamped "3516"-----	3, 516. 350
At summit of Ladds Canyon, 3 feet south of fence; iron post stamped "3757"-----	3, 757. 264
T. 5 S., R. 39 E., center of sec. 20, on east side of road, 1,000 feet south of deserted ranch house on Clover Creek; iron post stamped "3363"-----	3, 363. 460
North Powder, 4.9 miles north of, at bend in road, 10 feet south of fence corner; iron post stamped "3346"-----	3, 345. 694
North Powder, 2.2 miles north of, 1 mile north of Wolf Creek, on summit of first hill north of creek, east edge of road; iron post stamped "3389"-----	3, 388. 838
North Powder, 50 feet west of station, at fence corner; iron post stamped "3235"-----	3, 241. 635
North Powder, southeast wall (limestone) of I. O. O. F. building, 4 feet southwest of east corner, 5 feet above ground; intersection of cross lines on copper bolt stamped $\frac{U}{8}$ / $\frac{G}{8}$ -----	3, 255. 953

**Permanent bench mark near Medical Springs to Union.<sup>1</sup>**

Medical Springs, 2.6 miles southwest of, at bend in Telocaset road, 600 feet west of Beagle Creek; iron post stamped "3186"-----	3, 185. 519
Medical Springs, in front of hotel, 2 feet west of fence; iron post stamped "3387"-----	3, 387. 575
Medical Springs, 2 miles northwest of, on summit of divide between springs and The Park, 5 feet west of road; iron post stamped "3811"-----	3, 811. 167
On summit of first rise north of The Park, 20 feet west of road, in foot of blazed pine tree marked "T. B. M. 4154," nail-----	4, 158. 12
On summit of divide between The Park and Catherine Creek, 10 feet south of road; iron post stamped "4177 A"-----	4, 177. 583
Catherine Creek valley, 3.9 miles below Seek's sawmill, at 15 feet north of valley road from the north; iron post stamped "3218 A"-----	3, 217. 962
Union, 5.2 miles southeast of, in valley of Catherine Creek; iron post stamped "3023"-----	3, 023. 420
Union, 2 miles east of, at forks of road 650 feet north of Little Creek, 2 feet west of large square rock 6 by 6 by 6 feet; iron post stamped "2863"-----	2, 863. 727

**Arlington, Blalock Island, Heppner, and Umatilla Quadrangles.**

**GILLIAM, MORROW, AND UMATILLA COUNTIES.**

The elevations in the following list are based upon corrected heights along the Oregon-Washington Railroad & Navigation Co.'s track on a double-rodged line run in 1899 by H. S. Crowe. The original results of that line were published in the appendix to the Twenty-first Annual Report of the United States Geological Survey. The new adjustment first applies a rod correction of 0.001 foot per

<sup>1</sup> An excessive error has been distributed in this line.

vertical foot increasing differences of elevation (a correction determined by comparison with Coast and Geodetic Survey elevations south of Pendleton, Oreg.); second, adjusts a remaining closure error of 1.4 feet from Wallula, Wash., via Umatilla to Pendleton, Oreg.; and, third, raises the line between Arlington and Umatilla to agreement without additional adjustment.

The leveling in the Arlington, Blalock Island, and Heppner quadrangles was done in 1906 by John R. Evans and that in the Umatilla quadrangle in 1907 by T. J. McClain.

The leveling was done in cooperation with the State, and the bench marks were stamped with the State name.

#### ARLINGTON QUADRANGLE.

**Heppner Junction south along Heppner Branch, Oregon-Washington Railroad & Navigation Co.'s track to milepost 161.**

Heppner Junction, sec. 35, T. 4 N., R. 22 E., 18 feet west of corner of station, 10 feet south of track; iron post stamped "240 A"-----	Feet. 242. 029
T. 3 N., R. 22 E., sec. 12, 3.45 miles south of Heppner Junction, 60 feet west of road; iron post stamped "298 1906"-----	298. 661
T. 3 N., R. 22 E., north side of sec. 26, 6.4 miles south of Heppner Junction, 50 feet east of railroad, 200 feet west of road; iron post stamped "382 1906"-----	383. 364
T. 2 N., R. 22 E., sec. 1, 8.9 miles south of Heppner Junction at milepost 161, in rock cut 400 feet south of crossing, 15 feet west of track; aluminum tablet stamped "453 1906"-----	454. 263

#### BLALOCK ISLAND QUADRANGLE.

**Milepost 165 south along Heppner branch of Oregon-Washington Railroad & Navigation Co.'s track to Ione.**

T. 2 N., R. 23 E., sec. 17, 1,500 feet south of milepost 164, high bluff, 20 feet east of railroad, in rock; aluminum tablet stamped "546 A 1906"-----	546. 451
Cecils, T. 2 N., R. 23 E., sec. 29, 45 feet east of railroad; 20 feet south of road; iron post stamped "617 A 1906"-----	618. 444
T. 1 N., R. 23 E., NE. $\frac{1}{4}$ sec. 16, 270 feet south of milepost 170, 15 feet east of railroad, at a small cut, in rock; aluminum tablet stamped "722"-----	722. 617
Douglas, sec. 22, T. 1 N., R. 23 E., 100 feet east of milepost 172, 20 feet south of road, 45 feet east of railroad; iron post stamped "790 A 1906"-----	790. 976
T. 1 S., R. 23 E., sec. 2, 1,100 feet north of milepost 176, 800 feet south of road crossing, 10 feet east of county road, 40 feet west of railroad, in rock; aluminum tablet stamped "918 A 1906"-----	919. 085

**Point 2.5 miles south of Heppner Junction on Oregon-Washington Railroad & Navigation Co.'s line east 1.6 miles to crossroads (double-spur line).**

T. 3 N., R. 23 E., sec. 6, crossroads at small rise; iron post stamped "533 A 1906"-----	533. 547
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Milepost 161, 9.0 miles south of Heppner Junction on Oregon-Washington Railroad & Navigation Co.'s line, 2.7 miles northeast to Dalreed Butte (double-spur line).

Dalreed Butte, top of, T. 3 N., R. 23 E., sec. 29, 2.7 miles east of milepost 161, in rock; aluminum tablet stamped "763 A 1906"-----	Feet. 764.105
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**Ione north via Ella to Castle Rock.**

T. 1 N., R. 24 E., northwest corner of sec. 34, 2.9 miles north of Ione, southeast corner of intersection of two roads, 5 feet south of signboard; iron post stamped "1441 A 1906"-----	1,442.086
T. 1 N., R. 24 E., sec. 9, 6.24 miles north of Ione, at foot of hill, 60 feet north of intersection of two roads, 60 feet north of gulch; iron post stamped "1094"-----	1,095.241
Ella, east side of sec. 28, T. 2 N., R. 24 E., 100 feet east of schoolhouse; 30 feet west of center of road; iron post stamped "830"----	831.287
T. 2 N., R. 24 E., sec. 3, 3.08 miles north of Ella, 500 feet east of canyon, at mouth of gulch, on small round knoll, 140 feet north of lone juniper tree, in rock 10 by 10 by 18 inches; aluminum tablet stamped "725"-----	726.654
T. 3 N., R. 24 E., NE. $\frac{1}{4}$ sec. 34, 5.1 miles north of Ella, 250 feet west of road, white rock 2 by 3 by 4 feet; aluminum tablet stamped "655"-----	656.579
T. 3 N., R. 24 E., sec. 15, 7.02 miles south of Castle Rock, 20 feet west of road, on small rise; iron post stamped "631"-----	632.469
T. 4 N., R. 24 E., sec. 34, 3.89 miles south of Castle Rock, 300 feet from small rise, 10 feet east of road; iron post stamped "494"-----	495.400

**Crossroads 2.9 miles south of Ione along road east and north via Wells Spring to Coyote.**

T. 1 N., R. 25 E., near quarter corner south side of sec. 30, 3.67 miles east of Ione and Ella road, 10 feet north of road, 30 feet south of shack; iron post stamped "1490 A 1906"-----	1,490.805
T. 1 N., R. 25 E., near quarter corner south side of sec. 17, 6.08 miles south of Wells Springs, base of mileboard, at crossroads; iron post stamped "1187"-----	1,187.561
T. 1 N., R. 25 E., near quarter corner west side of sec. 4, 3 miles south of Wells Springs, at intersection of two roads, south and east of roads; iron post stamped "1070"-----	1,070.617
Wells Springs, T. 2 N., R. 25 E., sec. 20, 75 feet north of well, 125 feet northeast of house, in rock; aluminum tablet stamped "822"----	822.511
T. 2 N., R. 25 E., sec. 5, 3.21 miles north of Wells Springs, 60 feet west of corral north of Wells Springs Canyon, on hillside; iron post stamped "722"-----	722.795
T. 3 N., R. 25 E., sec. 21, 6.87 miles north of Wells Springs, 9.03 miles south of Coyote, 200 feet north of old road, on flat; iron post stamped "650"-----	650.914
T. 3 N., R. 25 E., sec. 4, 6.15 miles south of Coyote, 1,200 feet south of shack; iron post stamped "586"-----	586.837
T. 4 N., R. 25 E., sec. 22, 3.47 miles south of Coyote, 0.3 mile northeast of sand dune, on small rise; iron post stamped "415"-----	415.843



Crossroads 2 miles west of Strawberry by road east to South Spring, thence north via Finley ranch to milepost 177.

Strawberry, T. 1 N., R. 25 E., southwest corner sec. 14, across road from post office; iron post stamped "1205"-----	Feet. 1, 205. 611
South Springs, T. 1 N., R. 26 E., southwest corner of sec. 17, 20 feet north of post office, 3.3 miles east of Strawberry post office; iron post stamped "1160"-----	1, 160. 769
T. 1 N., R. 26 E., near quarter corner east side of sec. 6, 2.62 miles north of South Springs, at forks of roads, at northwest intersection; iron post stamped "1128"-----	1, 128. 741
T. 2 N., R. 26 E., sec. 28, 5.53 miles north of South Springs, 1.36 miles southwest of Finley house, 30 feet north of road, at fence; iron post stamped "1001"-----	1, 001. 821
T. 2 N., R. 26 E., sec. 9, south side of, 7.72 miles east of Wells Springs, at intersection of two roads; iron post stamped "892"-----	892. 890
T. 2 N., R. 26 E., NW. $\frac{1}{4}$ sec. 2, 2.4 miles north of emigrant road, 10 feet east of Sand Hollow road; iron post stamped "755"-----	755. 938
T. 3 N., R. 26 E., sec. 23, 5.75 miles north of emigrant road, 10 feet east of Sand Hollow road; iron post stamped "619"-----	619. 943
T. 3 N., R. 26 E., sec. 1, 6.29 miles south of Henkle ranch, 10 feet east of road; iron post stamped "620"-----	620. 967
T. 4 N., R. 26 E., sec. 14, 2.77 miles south of Henkle ranch, 30 feet northeast of forks of roads; iron post stamped "547"-----	547. 942
T. 5 N., R. 26 E., sec. 35, south side of, 100 feet north of barn of Henkle ranch, 400 feet north of road, in firm rock, 5 by 6 by 8 feet; aluminum tablet stamped "331"-----	331. 863

Cecils by emigrant road via Ella and Wells Springs to Finley ranch.

T. 2 N., R. 23 E., northwest corner of sec. 36, 6.72 miles west of Ella, 3.24 miles east of Cecils, east line of road at turn; iron post stamped "907"-----	908. 016
T. 2 N., R. 24 E., north side of sec. 29, 2.84 miles west of Ella, 7.12 miles east of Cecils, on small rise east of gulch, 30 feet south of county road; iron post stamped "820"-----	821. 366
T. 2 N., R. 25 E., near northwest corner of sec. 30, 3 miles east of Ella, 100 feet east of township line, 50 feet south of road, on hillside, in firm rock; aluminum tablet stamped "855"-----	856. 617
T. 2 N., R. 25 E., SW. $\frac{1}{4}$ sec. 14, 3 miles east of Wells Springs, at mouth of canyon, 600 feet east of creek in Juniper Canyon, 10 feet north of emigrant road, in firm rock; aluminum tablet stamped "693"-----	694. 072

South Springs east to point near quarter corner on south side of sec. 13, T. 1 N., R. 26 E.

T. 1 N., R. 26 E., near quarter corner on south side of sec. 13, 4.74 miles southwest of Pine City, on South Springs road, at southwest corner of long cemetery; iron post stamped "1474"-----	1, 475. 102
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Castle Rock south to Juniper Reservoir, thence east to Dry Lakes (United States Reclamation Service line).

Juniper Reservoir site, west end, at Carty's east fence, near road, iron post-----	603. 167
Dry Lakes, 1,000 feet northwest of lake and about 1,000 feet south-east of east dam site of Juniper reservoir site, iron post-----	650. 607

## HEPPNER QUADRANGLE.

## At Ione.

Ione, T. 1 S., R. 24 E., sec. 9, 1,360 feet west of station, 300 feet east of road crossing, 20 feet south of railroad, 15 feet north of road; iron post stamped "1068 A 1906"-----	Feet. 1,069.124
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## UMATILLA QUADRANGLE.

## Yoakum north in R. 30 E. to Cold Springs.

T. 3 N., R. 30 E., southwest corner sec. 25, 40 feet northeast of, 3 miles northeast of Yoakum siding, crossroads; iron post stamped "1306"-----	1,306.444
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T. 3 N., R. 30 E., 30 feet southwest of quarter corner east side of sec. 11, 6.5 miles northeast of Yoakum siding, where road turns west; iron post stamped "1064"-----	1,064.107
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T. 4 N., R. 30 E., corner secs. 23, 24, 25, and 26, 2.25 miles northeast of Foster ranch, at road forks, south side of Spain Gulch; iron post stamped "933"-----	933.391
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Vinson ranch, 0.75 mile northeast of, T. 5 N., R. 30 E., on line between secs. 25 and 26, 40 feet south of center of road, in Cold Spring Canyon; iron post stamped "856"-----	856.729
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T. 5 N., R. 30 E., south of center of sec. 15, 2.5 miles northeast of Vinson ranch, north side of road, 600 feet east of road forks to Sand Spur and Cold Springs; iron post stamped "1008"-----	1,008.187
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## Cold Springs (United States Reclamation Service bench mark).

Cold Springs, T. 5 N., R. 29 E., corner secs. 11, 12, 13, and 14; iron post-----	311.089
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## Point 2.8 miles south of Henkle ranch east to east line of R. 27 E., thence south to Stanfield ranch.

T. 4 N., R. 27 E., east of center of sec. 20, north side of road; iron post stamped "543"-----	544.135
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T. 4 N., R. 27 E., northeast of center of sec. 23, north side of Echo Road; iron post stamped "591"-----	592.178
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T. 4 N., R. 28 E., southwest corner, 40 feet north and east of stake at corner; iron post stamped "602"-----	603.233
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Lower Stanfield ranch, on west side of Butter Creek (United States Reclamation Service bench mark); iron post stamped "625"-----	627.145
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## Stanfield ranch south to Pine City, thence west to South Springs.

T. 2 N., R. 27 E., northeast corner of sec. 1; iron post stamped "793"-----	793.445
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T. 2 N., R. 27 E., southwest corner of sec. 14, 1.23 miles southwest of O. F. Thompson's ranch, on east side of road by fence corner; iron post stamped "916"-----	916.553
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T. 1 N., R. 27 E., northeast corner of sec. 3, 1.47 miles north of Pine City, 10 feet south of fence corner, 30 feet east of fork of Butter Creek and Heppner Roads; iron post stamped "1084"-----	1,084.514
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T. 1 N., R. 27 E., southwest part of sec. 16, 2.15 miles west of Pine City, between and 150 feet west of forks of Heppner and South Spring Roads; iron post stamped "1430"-----	1,431.217
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Pine City east to Alkali triangulation station, thence northwest 7.4 miles, thence west to southeast corner of sec. 1, T. 2 N., R. 27 E.

T. 1 N., R. 27 E., near northeast corner of sec. 23, at forks of Big Butter Creek and Ridge Roads; iron post stamped "1225"-----	Feet. 1, 226. 178
T. 1 N., R. 28 E., near northwest corner of sec. 28, north side of road at mouth and on west side of Ayers Canyon; iron post stamped "1389"-----	1, 390. 184
T. 1 N., R. 28 E., south side of sec. 13, on south side of Ridge Road 1.65 miles northeast of the Joe Vale ranch, beside fence; iron post stamped "2102"-----	2, 103. 321
T. 1 N., R. 29 E., northwest corner of sec. 22, 5.81 miles northeast of the Joe Vale ranch, on south side of Ridge Road, east slope of knoll 800 feet west of crossroads; iron post stamped "2152"-----	2, 153. 097
Alkali triangulation station, T. 1 N., R. 30 E., center of sec. 29, 0.75 mile northeast of Slusher ranch; triangulation tablet stamped "2713"-----	2, 713. 524
T. 1 N., R. 29 E., north of center of sec. 13, 3.5 miles north of Slusher ranch on Echo Road, at first crossroad north of Ridge Road, on east side of Echo Road and south side of crossroads; iron post stamped "2262"-----	2, 263. 363
T. 2 N., R. 29 E., southwest of center of sec. 26, 7.4 miles northwest of Slusher ranch, 20 feet east of Echo Road, 200 feet from where it leaves Big Alkali Canyon, 0.5 mile north of Winkle ranch; iron post stamped "1311"-----	1, 311. 713
T. 2 N., R. 28 E., 30 feet northwest of quarter corner on east side of sec. 13, 700 feet west of the white house on the Vale ranch; iron post stamped "998"-----	998. 809
Job triangulation station, on highest point on Sarvis Butte, northwest corner of sec. 22, T. 2 N., R. 28 E.; iron post stamped "1684"-----	1, 685. 348

Point 7.4 miles north of Alkali triangulation station north to Echo.

T. 2 N., R. 29 E., at southeast corner of sec. 4, on west side of Echo Road; iron post stamped "1119"-----	1, 120. 827
T. 3 N., R. 29 E., south side of sec. 22, United States Reclamation Service diversion dam, west end top, at north end of weir; aluminum tablet stamped "662"-----	663. 666
Echo, 1.8 miles south of, United States Reclamation Service diversion dam, 200 feet northwest of United States Reclamation Service permanent bench mark; iron post stamped "660"-----	661. 585

Dry Lakes east to Echo (United States Reclamation Service line).

Red Point, 5 miles west of Stanfield ranch, near road; iron post-----	665. 578
Lower Stanfield ranch, west side of Butter Creek; iron post stamped "625"-----	627. 145
Echo, 6 miles west of, 140 feet north of road, iron post-----	663. 500
Echo, 2 miles west of, point overlooking Butter Creek ditch; iron post-----	659. 500

Cazadero, Mount Hood, Stevenson, and Troutdale Quadrangles.

CLACKAMAS, MULTNOMAH, AND WASCO COUNTIES.

The elevations are based on bench marks of a double-rodged primary line along the Oregon-Washington Railroad & Navigation

Co.'s track as determined by the 1905 adjustment. The elevations along the railroad crossing Bridal Veil and Stevenson quadrangles are given in another list.

The leveling in the Mount Hood and Stevenson quadrangles was done in 1907 by S. N. Stoner; in the Troutdale quadrangle in 1906 by George Neuner, jr., and in 1907 by Stoner; and in the Cazadero quadrangle in 1906 by Neuner, in 1907 by Stoner, and in 1910 by E. M. Bandli.

#### TROUTDALE QUADRANGLE.

Troutdale along public road to point about 1.8 miles north of Powell Valley.

Troutdale, 100 feet northeast of station, 40 feet north of switch leading to Union Meat Co.'s establishment, 223 feet north of main track, in edge of field belonging to D. F. Buckridge; iron post stamped "41-A"-----	Feet. 41.460
Troutdale, 1.7 miles south of southwest corner of intersection of Portland base and Troutdale Road, at corner of fence; point on rock, marked "U. S.-217"-----	216.61

#### Brower northeast to Bridal Veil.

Brower, 150 feet west of Wittenburg house, 20 feet north of Wittenburg Road, in firm rock; aluminum tablet stamped "1622"----- 1,622.407

#### CAZADERO QUADRANGLE.

Point north of Powell Valley southeast along roads to Bull Run post office, thence northeast along roads to Brower.

Orient, in front of post office; hitching post-----	548.58
Bull Run, post office and store, 100 feet south of, 35 feet west of center of road, 30 feet north of wagon shed, in turn of fence, 10 feet east of gate; iron post marked with red paint "647"-----	647.147
Alms, northeast of, at junction of Walker, Prairie, and Troutdale roads, 30 feet east of bridge; iron post stamped "1104"-----	1,104.069
Alms schoolhouse, 2.1 miles northwest of, 20 feet west of junction of Troutdale road and road to A. C. Wihlon & Co.'s sawmill, about 2 miles south of Gordon Creek crossing, in triangle formed by three fir trees 6 inches in diameter, each bearing inscription "U.S.R.M." pointing toward post; iron post marked with red paint "969"-----	969.166
Alms, 3.1 miles east of, 660 feet west of Walker Prairie, 5 feet south of road, in firm rock 4 by 6 by 6 feet; aluminum tablet stamped "1955"-----	1,954.665
Alms, 5.4 miles east of, on Lookout Point, 10 feet west of Larch Mountain trail, in firm rock in rock mound; aluminum tablet stamped "2633"-----	2,633.306
Alms, 8.8 miles east of, 5 miles north of North Branch of Gordon Creek, in rock 8 feet west of railroad; aluminum tablet stamped "2274"-----	2,273.604

**Bull Run southeast along roads via Sandy and Firwood to point about 1.2 miles east of Salmon post office.**

Sandy, 5 feet north of east line of Bull Run road, 50 feet north of forks of road; iron post stamped "1012"-----	Feet 1, 012. 102
Firwood, at road forks, north edge of Salmon road, at base of signboard; iron post stamped "1206"-----	1, 206. 612
Firwood, 2.9 miles east of, on small rise, 300 feet south of Cedar Creek, north of road, in fence line; iron post stamped "1246"-----	1, 246. 256
Salmon, 4.5 miles west of, 0.4 mile west of Alder Creek, at Copper place, 20 feet south of Salmon road opposite Copper road, in cluster of trees; iron post stamped "895"-----	895. 351
Salmon, 0.9 mile west of, at intersection of Sandy and Marmot roads, 30 feet south of county bridge across Sandy River, 5 feet north of signboard; iron post stamped "999"-----	999. 240

**Clarnie via Boring, Sandy, and Dover to Eagle Creek.**

Clarnie, 250 feet northwest of station platform, 150 feet east of bunk house, 60 feet north of track, 90 feet west of section house; iron post stamped "205 A"-----	204. 753
Clarnie, 2.6 miles southeast of, 1 foot north of southwest corner fence post, 30 feet southwest of crossroad intersection, on base line road, in southwest corner of crossroads; iron post stamped "201"-----	290. 910
Rockwood, 1 foot northeast of northeast corner of lot, 27 feet west of northwest corner of K. O. T. M. hall No. 61, 75 feet southeast of T road intersection from north, south of base line road; iron post stamped "245"-----	244. 649
Rockwood, 1 mile southeast of, at T road to south from base line road, in southeast corner of road intersection, in root of first tree (12 inches in diameter); copper nail marked "258.3"-----	258. 26
Rockwood, 2.5 miles southeast of, at first crossroad in Gresham coming from north, bowlder in southwest corner near sidewalk; circle of paint marked "314.1"-----	314. 04
Gresham, 30 feet south of west end of Portland Railway, Light & Power Co. station, 10 feet south of track, 12 feet southwest of track and road intersection; iron post stamped "Prim. Trav. Sta. No. 1, 308"-----	307. 750
Boring, 130 feet north of station, 10 feet west of track, 20 feet north of road at crossing near station; iron post stamped "502"-----	501. 882
Kelso, in northeast corner of sec. 9, T. 2 N., R. 4 E., in northwest corner of C. T. Gindall's yard, 2 feet south of fence, 1 foot east of fence corner opposite store, 60 feet southeast of crossroad intersection; iron post stamped "703"-----	700. 404
T. 2 N., R. 4 E., in east center of sec. 14, 45 feet southwest of road intersection, in southwest corner of crossroads, in root of large tree; copper nail marked "905.4"-----	905. 19
Sandy, 5 feet north of east line of Bull Run road, 50 feet north of forks of road; iron post stamped "1012"-----	1, 012. 102
Firwood, at road forks, north edge of Salmon Road, 30 feet north of T road intersection, at base of signboard; iron post stamped "1206"-----	1, 206. 612
Firwood, 0.5 mile south of, near west center of sec. 29, T. 2 N., R. 4 E., 30 feet northwest of road intersection, 15 feet from large fir tree, in northwest corner of crossroads; in root of tree; copper nail marked "1330.7"-----	1, 330. 48

Dover, 70 feet west of intersection of four roads, 10 feet north of road in northwest corner of crossroads of intersection north of Canyon Dover; iron post stamped "1231"-----	Feet. 1, 231. 114
T. 3 S., R. 4 E., east center of sec. 3, 0.5 mile west of Dover, 50 feet southeast of mail box, 0.25 mile south of H. S. Gibson's place and 0.25 mile west of E. T. Paulfrey's place; iron post stamped "943"-----	942. 270
T. 3 S., R. 4 E., in center of sec. 3, 115 feet southeast of intersection of T road to north; in root of small oak tree; copper nail marked "838.3"-----	838. 07
Eagle Creek, 2.4 miles east of, 25 feet south of road intersection, in northwest root of large fir tree; copper nail marked "572.2"-----	571. 90
Eagle Creek, on Portland Railway. Light & Power Co. right of way, 300 feet south of station, 40 feet west of track, opposite G. R. Morse's store, in corner of fence; iron post stamped "338"-----	337. 823
<b>Boring via Eagle Creek, Cazadero, and George to bench mark 2.4 miles east of Eagle Creek.</b>	
Barton, 27 feet southwest of county road, 45 feet west of track, 300 feet south of station; iron post stamped "263"-----	263. 126
Eagle Creek, 300 feet south of station, 40 feet west of track, in corner of fence opposite Morse's store; iron post stamped "337.9"-----	337. 823
Currinsville, in front of station; top of rail-----	405. 3
Estacada, 400 feet southeast of station, in southeast corner of Estacada Hotel yard, 1 foot in yard from southeast corner fence post; iron post stamped "464"-----	463. 841
Cazadero, 2 feet from northwest corner of station, 12 feet southwest of track; iron post stamped "509"-----	509. 134
Cazadero, 5.5 miles northeast of, 25 feet east of road, 5 feet east of southeast corner fence post, 4 feet west of mail box, 2 feet north of Bowerman's fence; iron post stamped "1256"-----	1, 256. 174
George, 2.5 miles east of, 30 feet east of T-road intersection from south, 2 feet north of southeast corner fence post; iron post stamped "1511"-----	1, 511. 081
George, 30 feet northeast of T-road intersection from east, in northeast fence corner, 20 feet east of road; iron post stamped "1175"-----	1, 175. 045
Firwood, 6.7 miles southwest of, 2.4 miles east of Eagle Creek, 25 feet southeast of road intersection, in northwest root of large fir tree; copper nail marked "572.3"-----	571. 90
<b>Estacada along public roads via Springwater, Elwood, and Colton to Clarks (unchecked spur line).</b>	
Springwater, 1 mile southeast of, 3 feet east of signpost, 1 foot northwest of southeast corner fence post, 35 feet southwest of T-road intersection to south; iron post stamped "Prim. Trav. Sta. No. 12, 1200"-----	1, 200. 232
Springwater, 1.7 miles southeast of, 20 feet east of intersection, 10 feet from road, in northeast corner at Y-road intersection, in root of large fir tree; copper nail marked "1016.2"-----	1, 015. 998
Elwood, in southeast corner of school yard, 2 feet northwest of southwest corner fence post, 30 feet northwest of crossroads; iron post stamped "1099"-----	1, 098. 655
Colton, 2 feet west of northwest corner of Swedish Church belfry, 110 feet south of road, west of T road south; iron post stamped "705"-----	705. 180

Colton, 1.3 miles west of, at Cedardale school (district No. 53), 75 feet northeast of road intersection, 21 feet northwest of southwest corner of schoolhouse, in root of tree; copper nail marked "496.2"	Feet. 496.08
Clarks, 1.5 miles south of, in northeast corner at T-road intersection to east, 35 feet northeast of T-road intersection, in root of large maple tree; copper nail marked "862.5"	862.37
Clarks, 2 feet east of Methodist Church, in southeast corner of cross-roads, 45 feet west of road, 400 feet northwest of store; iron post stamped "885"	884.306
Clarks, 2.3 miles north of, 0.3 mile south of first crossroads south of New Highland schoolhouse, 10 feet west of road at foot of hill, in large stump; nail marked "1035.3"	1,035.07

**At Lenhard Mountain (by a checked spur line).**

Lenhard Mountain, top of north point, 0.4 mile north of Lenhard's house, in firm boulder; aluminum tablet stamped "2116"	2,115.886
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**MOUNT HOOD QUADRANGLE.**

Point 1.8 miles east of Salmon post office, northeast along roads to point about 2.4 miles northeast of Lost Lake.

Salmon, 2.1 miles east of, at northeast corner of Rossalsky's meadow, 500 feet north of barn, 10 feet south of road; iron post stamped "1206"	1,206.187
Salmon, 4.2 miles east of, 30 feet south of road, 300 feet east of junction of toll road and Welche's road, 75 feet north of schoolhouse; iron post stamped "1335"	1,335.137
Salmon, 7.8 miles east of, 0.4 mile east of Sandy River, 5 feet north of Lost Lake Road, 100 feet north of ranch house, in firm boulder, aluminum tablet stamped "1626"	1,625.756
Salmon, 11.6 miles east of, 650 feet north of Clear Fork Camp, 200 feet east of Clear Fork Creek, at west base of Last Chance Mountain on Lost Lake trail, in firm boulder; aluminum tablet stamped "2140"	2,140.111
Clear Fork Camp, 2 miles northeast of, 4.2 miles south of Bull Run Lake, 200 feet east of North Branch of Clear Fork Creek, north of trail, on steep point, in firm boulder; aluminum tablet stamped "2538"	2,537.900
Bull Run Cabin, 0.5 mile east of, 0.97 mile south of Bull Run Lake, 5.23 miles north of Clear Fork Camp, 10 feet east of Lost Lake trail, in firm boulder; aluminum tablet stamped "3714"; painted on tree near boulder "B. M.-3714"	3,714.535
Lost Lake, 0.8 mile south of, 10 feet west of Lost Lake trail, on divide between Jouis Creek and Lost Lake, in firm boulder; aluminum tablet stamped "3902"	3,902.393
Lost Lake, 1.5 miles east of, on Lost Lake Road, 0.4 mile east of divide 30 feet south of road, in firm boulder; aluminum tablet; painted on boulder "3214"; painted on tree north of boulder "B.M.U.S.G.S."	3,214.39

**STEVENSON QUADRANGLE.**

Point 2.4 miles northeast of Lost Lake along roads to Hood River Station.

Lost Lake, 4.7 miles east of, on ridge between Hood and Lake Branch Rivers, in clearing, 20 feet south of a bunch of trees, 15 feet west of road, in firm boulder; aluminum tablet; painted on tree north of boulder "2007-U. S."	2,007.160
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Lost Lake, 7.5 miles east of, 0.5 mile east of Markley ranch house, 300 feet west of bridge, 400 feet west of mouth of Lake Branch Creek, 5 feet north of road, in firm boulder; aluminum tablet stamped "1277"-----	Feet. 1, 277. 508
Winans, 3.1 miles west of, 600 feet west of old lumber camp, opposite Gordon place, 600 feet south of dam, 10 feet west of road, in firm boulder; aluminum tablet stamped "1194"; painted on tree "B.M."-----	1, 193. 850
Winans, 500 feet west of station, 250 feet east of bridge across Hood River, on first bench above creek, 15 feet east of road, in firm boulder; aluminum tablet stamped "863"; painted on tree 15 feet east of boulder "B.M."-----	863. 480
Blucher, 0.7 mile east of station, 150 feet east of "12-mile" post, 30 feet south of center of railroad, in firm boulder; aluminum tablet stamped "855"-----	855. 358
Tucker, 1.1 miles north of, 4.5 miles south of Hood River, on divide, 500 feet south of church, 20 feet west of center of road, in firm boulder; aluminum tablet stamped "671"-----	670. 800

**Riddles Quadrangle.****DOUGLAS, JACKSON, AND JOSEPHINE COUNTIES.**

The elevations in this list are based on the latest adjusted elevations on the precise level line run in 1903 along the Southern Pacific Railroad from the California State line to Portland.

The leveling was done in 1901 by C. L. Nelson.

The stamped elevations on the bench marks were based upon railroad data and differ considerably from the adjusted values.

**RIDDLES QUADRANGLE.**

Glendale northeast along county roads to Galesville, thence north to Canyonville and west to Riddles.

Glendale, at station; top of rail-----	Feet. 1, 417. 9
Galesville, 30 feet southeast of hotel, 40 feet north of road; iron post stamped "1551 G"-----	1, 531. 888
Summit, 8 feet west of road; iron post stamped "2046 G"-----	2, 026. 661
Canyon Creek, 100 feet north of, 200 feet southeast of Pickett house; iron post stamped "988 G"-----	968. 708
Canyonville, 1 foot south of southwest corner of Masons' Hall; iron post stamped "766 G"-----	747. 300
T. 30 S., on line between sec. 30, R. 5 W., and sec. 25, R. 6 W., 100 yards southwest of P. Ulam's house, 80 yards south of small summit, 16 feet west of road; iron post stamped "717 G"-----	697. 767

Canyonville east along country road up Umpqua River to Perdue schoolhouse.

Days Creek, 70 feet east of schoolhouse on line with its south side, 80 feet south of Days Creek and 50 feet south of bridge; iron post stamped "797 G"-----	777. 288
Days Creek, 80 feet northwest of schoolhouse, 18 feet west of small creek bed, 345 feet north of Umpqua River, 6 feet south of road; iron post stamped "911 G"-----	891. 773



**Days Creek post office northeast along county road up Days Creek to house of John Gilbo.**

John Gilbo's house, 250 yards northeast of, 135 feet north of Days Creek, 8 feet south of road, on township line; iron post stamped "937 G"----- Feet.  
917. 751

**Johns ranch east along county road up Cow Creek to Binger.**

Binger meadows, 180 feet southwest of southwest corner of rail fence, 72 feet east of Sugar Creek, 10 feet north of road; iron post stamped "1860 G"----- 1, 940. 822

**Redfield's house south along old stage road to Wolf Creek.**

T. 33 S., R. 6 W., in sec. 2, 20 feet west of road, at summit; iron post stamped "1949 G"----- 1, 929. 571

Wolf Creek, 80 feet north of McKinsey Hotel, 100 yards north of Wolf Creek bridge, 3 feet east of fence; iron post stamped "1295 G"----- 1, 276. 322

**Wolf Creek south along old stage road to Merlin.**

T. 34 S., R. 6 W., in sec. 2, Espe house, 200 yards northeast of, 25 feet northeast of intersection of roads, at foot of signpost; iron post stamped "1247 G"----- 1, 227. 873

Merlin, 100 feet south of Harris Creek, 200 feet east of Jump-off-Joe Creek, on property of D. W. Mitchell, 100 feet west of track; iron post stamped "920 G"----- 900. 504

**Grave post office east along county road up Grave Creek to Pease ranch.**

Placer, 0.5 mile northeast of, 4.5 feet south of section post at corner of sections 4, 5, 8, and 9; iron post stamped "1600 G"----- 1, 580. 181

Pease ranch house, 400 yards northwest of, 12 feet east of ditch, at north corner between sections 5 and 6; iron post stamped "2493 G"----- 2, 473. 874

**Schoolhouse 2.5 miles east of Merlin east up Jump-off-Joe Creek to Winona.**

Winona, 1 mile northwest of, 0.3 mile southeast of Pollock ranch house, 900 feet south of county road, 0.3 mile south of Jump-off-Joe Creek, 100 feet south of line between Tps. 34 and 35, secs. 5 and 6, R. 5 W., 100 yards east of line between secs. 5 and 6, T. 35 S., R. 5 E.; iron post stamped "1448 G"----- 1, 428. 776

**Woodville north along county road up Evans and Pleasant Creeks via Wimer to Clark house.**

Wimer, 30 feet west of post office and store, 6 feet south of line along front of store; iron post stamped "1160"----- 1, 134. 577

Clark house, at southeast corner of lot owned by E. Cameron, 150 feet east of Pleasant Creek, 35 feet east of intersection of county road with ranch road; iron post stamped "1399 W"----- 1, 373. 712

**Wimer northeast via county road up Evans Creek to Rock Creek.**

T. 35 S., R. 3 W., north part of sec. 5, southwest corner of May's schoolhouse, 250 feet east of Mays Creek; iron post stamped "1333 W"----- 1, 308. 137

T. 34 S., R. 3 W., near northeast corner sec. 26, Briscoe house (owned by W. Bybee), 5 feet southeast of southwest corner of; iron post stamped "1494 W"-----	Feet. 1,468.685
Rock Creek and Evans Creek, 100 feet north of junction of, 500 yards northwest of cabin property of E. G. Borden on knoll; iron post stamped "1886 W"-----	1,860.531

## Grants Pass, Kerby, and Medford Quadrangles.

## JACKSON AND JOSEPHINE COUNTIES.

These elevations are based on the latest adjustment of the precise-level line run in 1903 along the Southern Pacific Railroad from the California State line to Portland.

The leveling was done in 1904 by E. M. Fry.

## GRANTS PASS QUADRANGLE.

Grants Pass west along highways to mouth of Applegate Creek, thence south-east via Murphy, Provolt, and Applegate to Ruch.

Grants Pass, 4.5 miles southwest of, 1,200 feet southeast of house on Neighbor ranch, at west side of road; iron post stamped "914 B 1904"-----	Feet. 914.783
Grants Pass, 8 miles southwest of, 2 miles east of Applegate Creek bridge, 1,200 feet south of house on Joss ranch, at forks of Wilderville and Jerome Prairie roads; iron post stamped "964 B 1904"---	964.808
Murphy, 3.9 miles northwest of, 150 feet north of Stringer ranch house, 70 feet northwest of front gate, north side of road; iron post stamped "1084 B-1904"-----	1,084.856
Murphy post office, 50 feet west of store and post-office building, 800 feet north of bridge over Applegate Creek, 25 feet southeast of road forks; iron post stamped "1061 B 1904"-----	1,061.970
Williams Creek, 0.5 mile northeast of mouth of, 10 feet east of east end of Williams Creek bridge, 300 feet west of house on Provolt ranch, at south side of road; iron post stamped "1161 B 1904"---	1,161.931
Applegate, 40 feet southeast of store and post office, 650 feet northwest of bridge over Applegate Creek, east side of county road; iron post stamped "1275 B 1904"-----	1,275.616
Applegate post office, 2.9 miles east of, on ranch of Mrs. Sarah O'Brien in south wall of brick drying house; aluminum tablet stamped "1332 B 1904"-----	1,332.965
Ruch post office, 150 feet north of store and post office, 100 feet northwest of well and 100 feet west of blacksmith shop, in forks of road; iron post stamped "1525 B 1904"-----	1,526.080

Woodville south along Southern Pacific Railroad to Bolt, thence south along highways via Foots and Forest Creeks to Ruch.

Woodville, 0.7 mile north of, east side of Southern Pacific Railroad track, 3 feet north of milepost 467; iron post stamped "993 B"-----	994.128
Draper, 2 miles northwest of, 300 feet northwest of Ruble ranch house, 100 feet south of reservoir, north side of road; iron post stamped "1367 B 1904"-----	1,367.861
Summit of divide, between Left Fork of Foots Creek and Forest Creek (Jackson's Creek), 10 feet south of road; iron post stamped "2981 1904"-----	2,981.948

**Bridge over Applegate Creek near Wilderville west and north to Merlin.**

Timpy Creek, 2 miles north of mouth, in rock ledge at north end of bridge; aluminum tablet stamped "863 B 1904"-----	Feet. 863. 777
Merlin, 4.5 miles southwest of, 150 feet southwest of Robinson ranch house, 75 feet east of barn, east side of road at corner of yard fence; iron post stamped "871 B 1904"-----	871. 942
Merlin, 90 feet west of railroad, 30 feet north of Mitchell's store; iron post stamped "900 B"-----	900. 504

**Point near Wilderville via Mooney Mountain Road to Dryden.**

Wilderville, 75 feet southeast of post office, 100 feet west of store, 50 feet north of B. Smith's shop, north side of road near fence; iron post stamped "936 B 1904"-----	934. 783
Wilderville, 5.5 miles south of, 600 feet north of Burrows ranch house, 25 feet north of fence corner, 10 feet west of road at foot of Mooney Mountain, on grade; iron post stamped "1219 B 1904"-----	1, 219. 687
Deer Creek Forks, 0.5 mile northeast of, 0.5 mile east of Evans ranch house, 300 feet east of fence corner, 400 feet northwest of foot of old road grade, in stone in place; aluminum tablet stamped "1778 B 1904"-----	1, 778. 896
Summit of divide between Murphy Creek and East Fork of Deer Creek at west side of trail at summit; iron post stamped "3126 B"-----	3, 127. 122
Case Creek, 200 feet west of mouth, 10 feet north of creek, 20 feet west of trail at Case Creek crossing, 200 feet south of double log cabin, in top of rock; aluminum tablet stamped "1594 B 1904"-----	1, 595. 251

**Provolt south along road via Williams to Thompson Creek Schoolhouse.**

Williams post office, 3 miles east of, 100 feet northwest of San Francisco Mining Co.'s bunk house, 300 feet east of barn, east side of road; iron post stamped "1301 B 1904"-----	1, 301. 953
Williams post office, 2 feet north of store and post office, 150 feet south of David John's residence, west side of road, near fence; iron post stamped "1368 B 1904"-----	1, 369. 007
Baltimore schoolhouse, 0.2 mile north of, 20 feet south of road forks, 4 feet west of fence; iron post stamped "1510 B 1904"-----	1, 511. 099
Thompson Creek schoolhouse, 0.2 mile south of; iron post stamped "1684 B"-----	1, 684. 845

**Applegate post office south along road to Thompson Creek schoolhouse.**

Applegate post office, 40 feet southeast of store and post office, 650 feet northwest of bridge over Applegate Creek, east side of county road; iron post stamped "1275 B 1904"-----	1, 275. 616
Applegate post office, 3.1 miles south of, 1,000 feet south of Elmore ranch house, 4 feet from west end of wagon bridge over Thompson Creek, in top of stone; aluminum tablet stamped "1495 B 1904"-----	1, 495. 835

**Thompson Creek schoolhouse south along road and via Steamboat to Watkins, thence northeast to Rich post office.**

Thompson Creek schoolhouse, 0.2 mile southwest of, 150 feet north of bridge over Thompson Creek, west side of road near forks; iron post stamped "1684 B"-----	1, 684. 845
Houston ranch, 0.7 mile south of, 10 feet east of road, 600 feet east of Thompson Creek; iron post stamped "2093 B 1904"-----	2, 094. 105

Steamboat, 3.5 miles northwest of, 15 feet east of small bridge over Ozuc ditch, at summit of divide between Thompson Creek and O'Brien Fork of Applegate River, on summit 10 feet east of road; iron post stamped "3196 B 1904"-----	Feet. 3, 197. 389
Steamboat, 250 feet west of stamp mill, 150 feet west of house, 300 feet north of barn, 1 foot from fence at west side of road; iron post stamped "2445 B 1904"-----	2, 446. 316
Steamboat, 3.5 miles southwest of, 2 miles northwest of Watkins, in stone, 100 feet north of trail, at summit of divide; aluminum tablet stamped "3318 B 1904"-----	3, 319. 694
Watkins post office, 800 feet south of, 150 feet north of Applegate River, 570 feet southwest of corner of sec. 35, T. 40 S., R. 4 W., 10 feet west of big gate; iron post stamped "1849 B 1904"-----	1, 850. 911
Watkins post office, 3 miles northeast of, 200 feet east of Watkins's ranch house, 15 feet east of wagon road; iron post stamped "1811 B 1904"-----	1, 813. 132
Kreman's sawmill, 0.7 mile northeast of, 20 feet southwest of Silva ranch house, east side of road, 1 foot southwest of corner of yard fence; iron post stamped "1672 B 1904"-----	1, 674. 481
Neds Gulch, 0.1 mile northeast of mouth of, 75 feet north of bunk house of Swain mine, 200 feet north of post office, 10 feet east of road; iron post stamped "1541 B 1904"-----	1, 543. 595
Forks of Applegate River, 0.1 mile east of, 600 feet east of Cameron ranch house, at forks of road, 1 foot outside of rail fence; iron post stamped "1462 B 1904"-----	1, 464. 874

## MEDFORD QUADRANGLE.

Ruch east to Medford.

Jacksonville, south wall of United States Hotel, corner of California and Fifth Streets, 2 feet above sidewalk near southwest corner of building; aluminum tablet stamped "1568 B 1904"-----	1, 568. 551
Medford, in west wall of Hotel Nash; aluminum tablet stamped "1376 B"-----	1, 377. 097

## KERBY QUADRANGLE.

Wilderville southwest along road via Anderson and Selma to Dryden.

Wilderville, 3.5 miles southwest of, 75 feet southwest of Wonder store and post office, 1 foot north of fence; iron post stamped "1077 B 1904"-----	1, 077. 815
Louis station, 12 feet northeast of front steps to hotel, 100 feet northwest of stage barn, at west side of road, 1 foot outside of fence; iron post stamped "1226 B 1904"-----	1, 226. 832
Selma, 2.2 miles northeast of, 20 feet east of house at Anderson station, 200 feet north of barn, 1 foot outside of fence; iron post stamped "1454 B"-----	1, 454. 884
Selma, 6 feet south of post office, 100 feet southwest of platform scales, corner of fence at west side of principal street; iron post stamped "1323 B 1904"-----	1, 323. 831
Selma, 2.6 miles east of, 4 feet from southeast corner of Cemetery schoolhouse building, 200 feet west of road, 1 foot east of schoolhouse; iron post stamped "1378 B 1904"-----	1, 379. 002

**Point 5.5 miles south of Wilderville southwest to Dryden.**

Mooney Mountain, summit, 15 feet east of road, on side at highest point of wagon road; iron post stamped "2491 B 1904"-----	Feet. 2,491.619
Dryden post office, 0.4 mile north of, 12 feet from northwest corner of Dryden schoolhouse; iron post stamped "1437 B 1904"-----	1,437.696

**Dryden east along road 1.3 miles.**

Dryden post office, 1.3 miles east of, 0.25 mile northwest of Harman ranch house, 150 feet north of bridge over Deer Creek, 10 feet east of road; iron post stamped "1482 B 1904"-----	1,482.918
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**Ashland and Klamath 1° Quadrangles; Cline Falls, Crescent, Lava, Maiden Peak, and Prineville 30' Quadrangles; and Crater Lake National Park.**

**CROOK, JACKSON, AND KLAMATH COUNTIES.**

The bench marks in the following lists were established by a line of primary levels extended from Ashland to Prineville, Oreg., by L. F. Biggs in 1908. The elevation of the initial bench mark at Ashland, stamped "1874-B 1903," was accepted as 1,874.807 feet, and the elevation of the closing bench mark, an iron post stamped "2867-H" near the courthouse at Prineville, was accepted as 2,867.495 feet above mean sea level.

**ASHLAND QUADRANGLE.**

**Ashland via Dead Indian Mountain to Pelican Bayou, Lower Klamath Lake, thence to Fort Klamath.**

Ashland, 1,800 feet south of station, 42 feet east of Mountain Avenue crossing, south side of street; iron post stamped "1874 B 1903"-----	Feet. 1,874.807
Ashland, 2.4 miles east of, south of road, opposite white house, in base of 36-inch oak tree; spike with aluminum tag stamped "1913 B. M. 2"-----	1,913.54
Ashland, 4 miles northeast of, 20 feet south of road, above creek, opposite Indian Head Rock, in boulder; aluminum tablet stamped "2002 B 1908 B. M."-----	2,003.45
Ashland, 6 miles north of, south of road, on west bank of creek, in base of 20-inch oak tree; spike with aluminum tag stamped "2179 B. M. 5"-----	2,179.824
Ashland, 7.2 miles north of, 50 feet west of road, 200 feet north of junction of roads, on boulder; chisel point painted "2660 B. M. 7"-----	2,660.32
Ashland, 8.2 miles northeast of, 15 feet west of road, 200 feet north of house on point of hill, in large boulder; aluminum tablet stamped "2944 B 1908 B. B."-----	2,945.047
Summit of Dead Indian Mountain, 15 feet south of road, in large boulder; aluminum tablet stamped "5232 B 1908 B. C."-----	5,232.978
Summit of Dead Indian Mountain, 1.1 miles northeast of, north of road, in base of 30-inch fir tree; spike with aluminum tag stamped "4833 B. M. 15"-----	4,834.33
Lillyglen, 100 feet west of post office, at fence; iron post stamped "4537 B 1908 B. D."-----	4,538.201

	Feet.
Deadwood, 300 feet east of stage station, 150 feet west of barn, west of road, in base of 36-inch pine tree; spike with aluminum tag stamped "4634 B. M. 21"-----	4, 635. 05
Deadwood, 3 miles northeast of, 200 feet north of Butte Creek, north of road, in large bowlder; aluminum tablet stamped "4847 B 1908 B. E."-----	4, 847. 837
Deadwood, 5.8 miles northeast of, 25 feet north of road, 600 feet south of cabin, 0.7 mile southwest of summit, in large bowlder; aluminum tag stamped "5031 B. M. 30"-----	5, 031. 6
Lake of the Woods, 4 miles southwest of, 25 feet south of road, at junction of road to Buck Lake; iron post stamped "5134 B 1908 B. G."-----	5, 134. 96
Lake of the Woods, 1.9 miles southwest of, south of road, on summit of ridge, in base of 48-inch larch tree; spike with aluminum tag stamped "5372 B. M. 29"-----	5, 373. 72
Lake of the Woods, 0.9 mile southwest of, south of road, 150 feet south of creek, in base of 24-inch tamarack tree; spike with aluminum tag stamped "5031 B. M. 30"-----	5, 031. 6
Lake of the Woods, southeast corner of, 100 feet east of lake, 40 feet west of road; iron post stamped "4960 B 1908 B. H."-----	4, 960. 090
Lake of the Woods, northeast end of, southwest end of flat, north of road, in base of 36-inch fir tree; spike with aluminum tag stamped "4968 B. M. 33"-----	4, 967. 98
Lake of the Woods, 1.5 miles northeast of, north of road, 1,000 feet north of large draw, 10 feet south of fir tree which is blazed on east side, in large bowlder; aluminum tablet stamped "4998 B 1908 B. I."-----	4, 998. 444
Pelican Bay Lodge, 4.4 miles southwest of, at intersection of roads to Odessa and Pelican Bay; iron post stamped "4202 B 1908 B. K."-----	4, 202. 154
Pelican Bay Lodge, 0.2 mile west of, 25 feet north of road, 300 feet east of junction of roads, in large bowlder; aluminum tablet stamped "4153 B 1908 B. L."-----	4, 152. 711
Pelican Bay Lodge, at boat landing; United States Geological Survey water gage zero-----	4, 135. 997
Pelican Bay Lodge, 2.3 miles northeast of, north of road, at road to old cabin, in base of 36-inch fir tree; spike with aluminum tag stamped "4207 B. M. 42"-----	4, 210. 44
Pelican Bay Lodge, 5.1 miles northeast of, north of road, where road runs down to marsh, flat bowlder under 12-inch fir tree blazed on east side; aluminum tablet stamped "4150 B 1908 B. M."-----	4, 149. 747
Crystal, 200 feet south of schoolhouse, 60 feet north of junction of road to Brown's ranch; iron post stamped "4163 B 1908 B. N."-----	4, 162. 978
Crystal, 2.7 miles northeast of, east of road, 50 feet north of Cherry Creek, in base of 36-inch pine tree; spike with aluminum tag stamped "4221 B. M. 48"-----	4, 221. 21
Crystal, 5.2 miles northeast of, north of road, at small meadow, 300 feet south of fence, at bend of road, in large bowlder; aluminum tablet stamped "4176 B 1908 B. O."-----	4, 175. 604
Fort Klamath, 6.9 miles southwest of, south of road, in base of pine tree 36 inches in diameter; spike with aluminum tag stamped "4180 B. M. 52"-----	4, 180. 55
Fort Klamath, 4.7 miles southwest of, at intersection of roads from east; iron post stamped "4152 B 1908 B. P."-----	4, 151. 738

Fort Klamath, 1.9 miles northwest of, east of road, at bend of road, in base of fence post; spike with aluminum tag stamped "4204 B. M. 65"-----	Feet. 4, 204. 26
Fort Klamath, 4.8 miles northwest of, west of road, 150 feet west of road junction, west of road, 25 feet north of 40-inch pine tree blazed on east side; iron post stamped "4317 B 1908 S. B."-----	4, 316. 898
Fort Klamath, 6.5 miles northwest of, east of road, 25 feet west of bank of creek, in base of 50-inch pine tree; spike with aluminum tag stamped "4536 B. M. 69"-----	4, 536. 18
Crater Lake National Park, south border of, 5 feet west of road, 3 feet west of park line post; iron post stamped "4780 B 1908 B. T."-----	4, 779. 946

**KLAMATH QUADRANGLE.****At Fort Klamath.**

Fort Klamath, 0.5 mile west of, south of road, 100 feet east of creek, 100 feet west of house, in base of 30-inch white birch tree; spike With aluminum tag stamped "4185 B. M. 55 A."-----	4, 185. 39
Fort Klamath, 50 feet south of northeast corner of schoolhouse, 6 feet north of fence; iron post stamped "4184 B 1908 B. V."-----	4, 183. 543

**Fort Klamath south to Klamath Indian agency boat landing.**

Fort Klamath, 4.4 miles south of, in cap of bridge over Wood River, spike scribed and painted "4151 B. M. 59"-----	4, 152. 76
Fort Klamath, 7.4 miles south of, east of road, 200 feet east of creek, at bend of road, 150 feet east of house, in large bowlder; aluminum tablet stamped "4157 B 1908 B. R."-----	4, 156. 788
Klamath Indian agency, northeast corner of water tower, in stone foundation; aluminum tablet stamped "4169 B 1908 B. S."-----	4, 168. 678
Klamath Indian agency, 2.9 miles south of, 50 feet south of road at intersection of roads, 100 feet east of gate to cabin, in base of 36-inch pine tree; spike scribed and painted "4212 B. M. 63"-----	4, 211. 85
Klamath Indian agency, boat landing; surface of water, July 17, 1908-----	4, 138. 5
Klamath Indian agency, 75 feet south of boat landing, in base of 30-inch pine tree scribed and painted "4144 B. M. 64"; spike-----	4, 143. 52

**Fort Klamath northeast along road.**

Fort Klamath, 1.3 miles east of, north of road at intersection of agency and sawmill roads, in base of 30-inch pine tree; spike with aluminum tag stamped "4176 B. M. 112"-----	4, 176. 69
Fort Klamath, 3.4 miles northeast of, east of road, north bank of drain, in base of 40-inch pine tree; spike with aluminum tag stamped "4199 B. M. 114"-----	4, 198. 799

**Fort Klamath north along county road.**

Fort Klamath, 2.2 miles north of, west of road, 50 feet south of barn, in base of 24-inch pine tree; spike with aluminum tag stamped "4218 B. M. 116"-----	4, 217. 60
Fort Klamath, 4.5 miles north of, 10 feet east of Sun Creek, north of road, at point where road crosses creek; iron post stamped "4305 B 1908 B. J. 1"-----	4, 304. 984

Fort Klamath, 7.5 miles northeast of, 5 feet south of road, 0.2 mile west of summit of ridge; iron post stamped "5329 B 1908 B. K. 1"-----	Feet. 5, 328. 873
Fort Klamath, 9.7 miles northeast of, south of road, in base of 30-inch black pine tree; spike with aluminum tag stamped "5242 B. M. 121"-----	5, 241. 84
Sand Creek, 6.7 miles southwest of, 15 feet north of road, 50 feet north of pine tree 60 inches in diameter broken at top; iron post stamped "5035 B 1908 B. L. 1"-----	5, 035. 948
Sand Creek, 3 miles southwest of, north of road, in base of 40-inch pine tree; spike with aluminum tag stamped "4673 B. M. 124"---	4, 672. 89
Sand Creek, 50 feet north of, south of road, at camp ground; iron post stamped "4561 B 1908 B. M. 1"-----	4, 561. 034
Cow Creek, 0.8 mile south of, west of road, in base of 30-inch pine tree; spike with aluminum tag stamped "4544 B. M. 127"-----	4, 543. 72
Cow Creek, 20 feet east of, 150 feet east of road, in ledge; aluminum tablet stamped "4549 B 1908 B. N. 1"-----	4, 548. 952
Cow Creek, 2.9 miles northeast of, north of road, 15 feet north of junction of road to Jackson's ranch; iron post stamped "4551 B 1908 B. O. 1"-----	4, 550. 919
Big Spring, 150 feet north of spring, on top of bank, 15 feet east of road; iron post stamped "4566 B 1908 B. P. 1"-----	4, 565. 249

## CRATER LAKE NATIONAL PARK.

Superintendent's house, Crater Lake Park, east and north to head of South Fork of Bear Creek, thence west and south to initial point.

Crater Lake Park, 6.3 miles south of superintendent's house, east of road, 25 feet west of edge of Annie Canyon, in base of 24-inch tamarack tree; spike with aluminum tag stamped "5121 B. M. 72"-----	5, 121. 16
Crater Lake Park, 4.4 miles south of superintendent's house, 20 feet west of road, on small flat, 125 feet west of Annie Canyon; iron post stamped "5508 B 1908 B. U."-----	5, 508. 482
Crater Lake Park, 2.5 miles south of superintendent's house, 300 feet east of Bridge Creek, east of road at sharp bend, 50 feet south of draw, in base of 36-inch larch tree; spike with aluminum tag stamped "5833 B. M. 75"-----	5, 833. 03
Crater Lake Park, 150 feet east of superintendent's house, 5 feet north of gate; iron post stamped "6016 B 1908 B. V."-----	6, 016. 099
Crater Lake, lowest point on rim of, 130 feet east of road, in base of larch tree; spike with aluminum tag stamped "7035 B. M. 81"---	7, 034. 55
Crater Lake, south rim of, at head of trail to lake, in large boulder; aluminum tablet stamped "7076 B 1908 B. W."-----	7, 076. 109
Crater Lake, 150 feet east of boat landing, surface of water; July 28, 1908-----	6, 177. 30
Crater Lake, 150 feet east of boat landing, 2 feet above water level, 50 feet east of small stream, in bed rock; aluminum tablet stamped "6179 B 1908 B. Y."-----	6, 178. 955
Crater Lake Park, 1.9 miles east of boat landing, 50 feet south of spring, on west slope of ridge between Anna and Sun Creeks, at large meadow, on boulder painted "7091 B. M. 86"; chisel mark---	7, 088. 27



Crater Lake Park, 4 miles east of superintendent's house by route, west slope of ridge between Anna and Sun Creeks, due north of Crater Peak, at large meadow, on rocky point, at fir tree trimmed 10 feet from top, in large bowlder; aluminum tablet stamped "6924 B 1908 B. Z."-----	Feet. 7,025.034
Crater Lake Park, on summit of ridge between Sun and Sand Creeks, due north of Mount Scott, paint point on small bowlder at base of signal; painted "7289"-----	7,339.60
Crater Lake Park, east slope of ridge between Sun and Sand Creeks, 630 feet east of summit, 20 feet west of cliff, on line between Mount Scott and Union Peak, in large bowlder marked by monument; aluminum tablet stamped "7260 B 1908 B. A. 1"-----	7,361.147
Crater Lake Park, summit of knob between east and west forks of Sand Creek, S. 60° west from Mount Scott, 20 feet east of trimmed tree, midway between two creeks, in bowlder 1 by 2 by 3 feet; aluminum tablet stamped "6987 B 1908 B. B. 1"-----	7,088.079
Crater Lake Park, in large meadow, east of Anderson Spring, on line between Mount Scott and Duttoncliff, on point of rock at monument, 200 feet east of timber, on rock; chiseled square, painted "7261"-----	7,361.79
Crater Lake Park, northwest of Mount Scott, on point on perpendicular cliff, at head of north fork of Bear Creek, in base of 36-inch fir tree; spike with aluminum tag stamped "7345 B. M. 90"-----	7,446.26
Crater Lake Park, at head of south fork of Bear Creek, 20 feet south of falls, 15 feet south of 40-inch black pine tree, broken at top and blazed and scribed on south side, in bed rock; aluminum tablet stamped "6331 B 1908 B. C. 1"-----	6,431.688
Crater Lake Park, 2 miles north of Cascade Spring, S. 70° west of round knob, on round point of small ridge, in base of 36-inch pine tree; spike with aluminum tag stamped "5844 B. M. 93"-----	5,944.42
Crater Lake Park, 4 miles northwest of Cascade Spring, S. 20° east of Timber Crater, north slope of ridge, in base of 72-inch pine tree; spike with aluminum tag stamped "5488 B. M. 95"-----	5,587.75
Crater Lake Park, 150 feet south of Dry Creek, 520 feet east of Crater Peak, north slope of ridge, at head of north fork of Bear Creek, in bowlder; marked by a monument with aluminum tablet stamped "5660 B 1908 B. D. 1"-----	5,760.143
Crater Lake Park, 1 mile west of east end of Pumice Desert, on summit of small round hill, 1 mile north of Grass Hill, 500 feet north of edge of timber, in lava rock; aluminum tablet stamped "5909 B 1908 B. E. 1"-----	6,009.980
Crater Lake Park, west end of Pumice Desert, direct line between Desert Cone and Red Cone, south edge of desert, in base of black pine tree 24 inches in diameter; spike with aluminum tag stamped "5920 B. M. 101"-----	6,020.39
Crater Lake Park, 1 mile southwest of Red Cone, S. 60° west of Red Cone, 100 feet west of spring in meadow, in large bowlder; aluminum tablet stamped "6164 B 1908 B. F. 1"-----	6,264.693
Crater Lake Park, 3 miles southwest of Red Cone on south bank of large canyon, in base of 48-inch fir tree; spike with aluminum tag stamped "6266 B. M. 104"-----	6,366.700
Crater Lake Park, 1 mile west of Glacier Peak, east end of large meadow, on summit of small ridge, S. 80° W. of Glacier Peak, in large bowlder; aluminum tablet stamped "5819 B. 1908 B. G."-----	5,920.038

Crater Lake Park, where Biber's sheep trail crosses north fork of Castle Creek, 15 feet west of trail, in base of 24-inch pine tree; spike with aluminum tag stamped "5792 B. M. 107"-----	Feet. 5, 893. 13
Crater Lake Park, 0.7 mile south of, north fork of Castle Creek, on trail to Biber's sheep camp, east of trail at small flat, in large boulder; marked by monument with aluminum tablet stamped "5829 B 1908 B. H. 1"-----	5, 929. 402
Crater Lake Park, 100 feet south of Hirschburger cabin, 50 feet west of creek, north of trail, in base of 24-inch black pine tree; spike with aluminum tag stamped "5890 B. M. 10"-----	5, 991. 16
Crater Lake Park, 2 miles northwest of superintendent's house, 50 feet west of junction of Old Crater Lake road and Biber's sheep trail, in large boulder; aluminum tablet stamped "5985 B 1908 B. L. 1"-----	6, 085. 995

## CRESCENT QUADRANGLE.

## Big Spring north along county road through Odell.

Big Spring, 4.5 miles northeast of, 15 feet east of road, 20 feet west of center one of four yellow pine trees; iron post stamped "4649 B 1908 B. Q. 1"-----	4, 648. 71
Big Spring, 6 miles northeast of, east of road, in base of 24-inch pine tree; spike with aluminum tag stamped "4681 B. M. 135"-----	4, 680. 20
Beaver Marsh, 2.9 miles south of, 50 feet north of junction of road to Silver Lake; iron post stamped "4655 B 1908 B. R. 1"-----	4, 654. 103
Beaver Marsh, 1 mile northeast of, east of road, in base of 30-inch black pine tree; spike with aluminum tag stamped "4673 B. M. 138"-----	4, 670. 96
Beaver Marsh, 2.5 miles northeast of, 50 feet east of road, 100 feet north of proposed railroad right of way; iron post stamped "4694 B 1908 B. T. 1"-----	4, 693. 357
Beaver Marsh, 6.7 miles northeast of, east of road, in base of 24-inch black pine tree; spike with aluminum tag stamped "4760 B. M. 142"-----	4, 759. 69
Beaver Marsh, 7.7 miles northeast of, west of road, 6 feet north of junction of Prineville and Eugene Road; iron post stamped "4720 B 1908 B. V. 1"-----	4, 719. 674
Beaver Marsh, 12.7 miles northeast of, east of road, west edge of Black Butte; iron post stamped "4638 B 1908 B. V. 1"-----	4, 638. 123
Beaver Marsh, 15.2 miles northeast of, east of road, in base of 30-inch yellow pine tree; spike with aluminum tag stamped "4656 B. M. 148"-----	4, 655. 40
Odell, 6.1 miles southwest, 1.5 miles southwest of spring, 15 feet west of road; iron post stamped "4508 B 1908 B. W. 1"-----	4, 507. 318
Odell, 3.7 miles southwest of, east of road, south slope of ridge, in base of 40-inch black pine tree; spike with aluminum tag stamped "4570 B. M. 151"-----	4, 509. 57
Odell, 1.3 miles southwest of, west of road, on summit of ridge, in base of 24-inch black pine tree; spike with aluminum tag stamped "4502 B. M. 153"-----	4, 501. 30
Odell, 60 feet north of post office, at small gate; iron post stamped "4453 B 1908 B. X. 1"-----	4, 452. 020

Odell, 2.2 miles northeast of, 20 feet east of road, in base of 48-inch yellow pine tree; spike with aluminum tag stamped "4392 B. M. 155"-----	Feet. 4, 391. 17
Odell, 4.6 miles northeast of, west of road, 15 feet west of road, west bank of drain; iron post stamped "4401 B 1908 B. Y. 1"-----	4, 400. 226

**MAIDEN PEAK QUADRANGLE.****Odell northeast along road to Rosland.**

Odell, 7.9 miles northeast of, 1,000 feet north of large barn on Taylor ranch, west of road, in base of 20-inch black pine tree; spike with aluminum tag stamped "4315 B. M. 159"-----	4, 313. 97-
Rosland, 10.2 miles southwest of, 40 feet east of sec. cor. 11, 12, 13, and 14, T. 2 and 3 S., R. 9 E.; iron post stamped "4297 B 1908 B. Z. 1"-----	4, 295. 885
Rosland, 7.9 miles southwest of, 10 feet east of road, at county line between Klamath and Crook counties; iron post stamped "4284 B 1908 B. A. 2"-----	4, 283. 795
Rosland, 5.2 miles southwest of, west of road, in base of 40-inch yellow pine tree; spike with aluminum tag stamped "4248 B. M. 113"-----	4, 248. 44
Rosland, 1.7 miles southwest of, west of road, in base of 30-inch black pine tree; spike with aluminum tag stamped "4238 B. M. 166"-----	4, 237. 53

**LAVA QUADRANGLE.****Rosland north along road to point near Bend.**

Rosland, southeast corner of post office, 10 feet east of building; iron post stamped "4227 B 1908 B. B. 2"-----	4, 225. 972
Rosland, 4.7 miles northeast of, 10 feet west of road, 25 feet north of telephone pole; iron post stamped "4205 B 1908 B. C. 2"-----	4, 204. 770
Rosland, 7.3 miles northeast of, 20 feet west of road, 500 feet west of house, in base of 24-inch black pine tree; spike, with aluminum tag stamped "4183 B. M. 172"-----	4, 187. 32
Rosland, 9.4 miles northeast of, 60 feet east of road, west slope of small ridge, in lava rock; aluminum tablet stamped "4197 B 1908 B. D. 2"-----	4, 196. 119
Rosland, 11.4 miles northeast of, 1,000 feet north of Vandwert ranch house, west of road, at fence line, in base of 48-inch yellow pine tree; spike, with aluminum tag stamped "4182 B. M. 175"-----	4, 181. 133
Rosland, 13.4 miles northeast of, west of road, in base of 20-inch black pine tree; spike, with aluminum tag stamped "4167"-----	4, 166. 28
Rosland, 14.8 miles northeast of, 125 feet east of road, 0.3 mile north of F. A. Shenquest's house, in lava rock; aluminum tablet stamped "4234 B 1908 B. E. 2"-----	4, 232. 907
Rosland, 16.7 miles northeast of, south slope of ridge, west of road, in base of 36-inch black pine tree; spike, with aluminum tag stamped "4247 B. M. 180"-----	4, 246. 29
Rosland, 17.8 miles northeast of, east of road, south slope of ridge, in base of 36-inch yellow pine tree; spike, with aluminum tag stamped "4362 B. M. 181"-----	4, 362. 60
Rosland, 19.8 miles northeast of, summit of ridge, east slope of Lava Butte, 40 feet east of road, in lava rock; aluminum tablet stamped "4507 B 1908 B. F. 2"-----	4, 506. 387

Bend, 9.2 miles southwest of, west of road, in base of 40-inch yellow pine tree; spike, with aluminum tag stamped "4180 B. M. 184"---	Feet. 4, 179. 70.
Bend, 6.9 miles southwest of, 15 feet west of road, 1,000 feet north of Wet Weather Spring, 200 feet south of second-class road, in lava rock; aluminum tablet stamped "3948 B 1908 B. G. 2"-----	3, 947. 291
Bend, 5.9 miles southwest of, west of road, in base of 36-inch yellow pine tree; spike, with aluminum tag stamped "3921 B. M. 186"---	3, 919. 76

## OLINE FALLS QUADRANGLE.

Bend northeast to point 9 miles southwest of Prineville.

Bend, 3.9 miles southwest of, west of road, in base of 36-inch yellow pine tree; spike, with aluminum tag stamped "3339 B. M. 188"---	3, 838. 70
Bend, 2.3 miles southwest of, west of road, south bank of irrigation ditch, 5 feet west of bridge, in lava rock; aluminum tablet stamped "3742 B 1908 B. H. 2"-----	3, 741. 452
Bend, east end of town, west of road, 200 feet east of water tower, in lava rock; aluminum tablet stamped "3647 B 1908 B. I. 2"-----	3, 645. 748
Bend, 163 feet west of old schoolhouse, 11 feet east of Pilot Butte stable, west side of Wall Street, at sidewalk line, 250 feet north of intersection of Wall and Nevada Streets, in lava rock; aluminum tablet stamped "3629 B 1908 B. J. 2"-----	3, 626. 217
Bend, 4 miles northeast of, south of road, on lava rock, painted "3478 B. M. 194"; chisel point-----	3, 477. 156
Bend, 4.8 miles northeast of, 20 feet west of road, 100 feet north of fence corner, 0.2 mile south of house, in lava rock; aluminum tablet stamped "3439 B 1908 B. K. 2"-----	3, 438. 215
Bend, 5.7 miles northeast of, west of road, 500 feet east of house, in base of 20-inch juniper tree; spike, with aluminum tag stamped "3417 B. M. 195"-----	3, 416. 40
Bend, 8.1 miles northeast of, 20 feet south of road, where road turns east around rocky ridge, in lava rock; aluminum tablet stamped "3342 B 1908 B. L. 2"-----	3, 341. 364
Bend, 9.8 miles northeast of, east of road, in base of 20-inch juniper tree; spike, with aluminum tag stamped "3327 B. M. 198"-----	3, 325. 93
Powell Butte stage station, 5.8 miles southwest of, 20 feet west of road, on small ridge, in lava rock; aluminum tablet stamped "3256 B 1908 B. M. 2"-----	3, 254. 467
Powell Butte stage station, 2.5 miles southwest of, west bank of old river channel, 50 feet east of road, 0.7 mile east of section line between secs. 17 and 18, T. 16 S., R. 14 E., in lava rock; aluminum tablet stamped "3170 B 1908 B. N. 2"-----	3, 169. 101
Powell Butte stage station, 1.1 miles southwest of, 50 feet east of road, 200 feet south of forks of road, at fence corner, in base of fence post; spike, with aluminum tag stamped "3145 B. M. 203"---	3, 143. 77
Powell Butte stage station, 0.2 mile east of, at intersection of road, corner of secs. 3, 4, 9, and 10, T. 16 S., R. 14 E., in lava rock 10 by 10 feet, flush with ground; aluminum tablet stamped "3251 B 1908 B. O. 2"-----	3, 249. 924
Powell Butte stage station, 4 miles northeast of, 15 feet north of road, 0.3 mile east of county road to Shepherd schoolhouse, in lava rock; aluminum tablet stamped "3121 B 1908 B. P. 2"-----	3, 119. 908
Powell Butte stage station, 5.2 miles northeast of, north of road, on lava rock, painted "3146 B. M. 209"; chisel point-----	3, 145. 46

## PRINEVILLE QUADRANGLE.

Point 9 miles southwest of Prineville northeast along road to Prineville.

Prineville, 6.1 miles southwest of, 40 feet east of road, in lava rock; aluminum tablet stamped "3257 B 1908 B.Q.2"-----	Feet. 3, 256. 15
Prineville, 3.8 miles southwest of, 15 feet east of road, in base of 24-inch juniper tree; spike with aluminum tag stamped "3240 B.M.214"-----	3, 238. 38
Prineville, 1.9 miles southwest of, 10 feet west of road, 0.2 mile west of stone quarry, on summit of hill, in lava rock; aluminum tablet stamped "3230 B 1908 Q3"-----	3, 228. 908
Prineville County courthouse, at main entrance gate, 10 feet from fence, 2 feet from walk; iron post stamped "2867 H"-----	2, 867. 495
Prineville County courthouse, northeast corner of, 4 feet above ground; aluminum tablet stamped "2872 B 1908 B.R.2"-----	2, 871. 161

## Portland Quadrangle (Oreg.-Wash.).

## MULTNOMAH COUNTY.

The elevations in the following list are based on the height of a bench mark at Portland determined in 1898 by J. H. Carlock by a double-rodged line from Astoria, Oreg., by which leveling an 1896 bench mark was redetermined.

The elevations for the Washington part of this quadrangle are given in Bulletin No. 457.

The leveling was done by C. C. Ward in 1896 and by J. H. Carlock in 1898.

## PORTLAND QUADRANGLE.

## At Portland.

Portland, in top of 2-mile stone on south side of Front Street, near Seventeenth Street, opposite E. & J. A. Martin's lumber mill; copper bolt stamped "28"-----	Feet. 30. 073
Portland, in stone base of center pillar of Fifth Street entrance to city hall; bronze tablet stamped "75"-----	76. 385
Portland, corner of Schuyler and Thirteenth Streets, in stone base of iron water tower, 3.7 feet in front of post at foot of stairway, 3.3 feet from base of tower; copper bolt stamped "145"-----	146. 927
Portland, in stone foundation at left of entrance to university building; bronze tablet stamped "175"-----	177. 258
Portland, 3 feet from corner of fence at northeast angle of crossing of Vancouver Avenue and Columbia Slough Road; iron post stamped "42"-----	44. 060

Portland along Columbia Slough and base line roads to city boundary.

T. 1 N., R. 2 E., NE. $\frac{1}{4}$ sec. 21, intersection of Sandy and Columbia Roads, in southwest corner of yard of large white house north of road; iron post stamped "72"-----	74. 210
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## PRIMARY LEVELING.

69

Ra. 2 and 3 E., wagon road on line between, east side of road, about 60 feet south of Oregon-Washington Railroad & Navigation Co.'s track; nail in root of three-pronged maple tree-----	Feet. 179.6
T. 1 N., T. 1 S., Ra. 2 and 3 E., corner of rail fence at southeast angle of crossroads; iron post stamped "251"-----	253.039
8-mile stone, top of, southeast corner-----	302.5
7-mile stone, top of-----	295.3
6-mile stone, top of-----	280
4-mile stone, top of-----	301.7
City boundary, south side of road, in northwest corner of orchard, 2.5 feet from the fences in the northwest corner of sec. 6, T. 1 S., R. 2 E.; iron post stamped "177"-----	179.155

**Brownsville, Elmira, Eugene, Halsey, and Monroe 15' Quadrangles (embracing several 7½' Quadrangles).**

## BENTON, LANE, AND LINN COUNTIES.

The elevations in the following list are based upon the precise level line along the Southern Pacific Railroad.

The leveling was done in the Eugene quadrangle in 1908 by C. E. Giffin and W. R. Chenoweth and in 1909 by W. B. Kern; in the Elmira quadrangle in 1909 by Kern and L. F. Biggs; and in the Monroe, Halsey, and Brownsville quadrangles in 1909 by Biggs and in 1910 by Alvin Finlay. The State cooperated in the work.

## ELMIRA QUADRANGLE.

**Point 1 mile south of Elmira east along highway to point 0.7 mile east of Oak Hill school.**

Madison, 0.9 mile south of, at fork in road (main road bends to east), three fir trees grown together at base, on south side of road, in root; copper nail and washer; blaze on small tree east side of big trees; aluminum tag stamped "398.8"-----	Feet. 398.80
Crow, 3.8 miles northeast of, 380 feet north of T road west, west side of road at fence line; iron post stamped "394.3"-----	394.325
Lewellyn, 1.1 miles east of, 300 feet west of Long Tom Creek bridge, north side of road, in base of 36-inch blazed oak tree; nail with aluminum tag stamped "378.1"-----	378.18
Lewellyn, 4.7 miles east of, 0.7 mile east of Oak Hill school, at north-south T road; iron post stamped "389"-----	388.535

**Point 4 miles north of Elmira south along highway to Crow, thence northeast 3.8 miles.**

Elmira, north end of bridge over Long Tom Creek, 5 feet west of telephone pole; iron post stamped "387"-----	387.070
Elmira, 1.9 miles south of, in small colony, at worm fence on north side of road; iron post stamped "486"-----	486.063
Crow, 5.1 miles south of Elmira, junction of Eugene and Elmira roads, in center of road, in base of 24-inch blazed oak tree; nail with aluminum tag stamped "549.7"-----	549.70
Crow, 0.9 mile northeast of, top of hill, at road bend, 100 feet from old cabin; iron post stamped "745.9"-----	745.887

Crow, 1.9 miles northeast of, opposite house, west of road, on fence line, in base of 12-inch blazed fir tree; nail with aluminum tag stamped "460"-----	Feet. 460.06
Crow, 3.8 miles northeast of, 380 feet north of T road west, west side of road, at fence line; iron post stamped "394.3"-----	394.325

**Elmira west along highway 4.4 miles.**

Elmira, 4.4 miles west of, 200 feet east of Long Tom Creek bridge, beginning of bridge approach, at foot of hill, 5-foot fir tree, on north side of tree, in root; copper nail and washer; aluminum tag in blaze on root stamped "424.4"-----	424.41
<b>Point 3.5 miles southwest of Irving west along highway 6 miles, thence northeast to point 5.3 miles northeast of Smithfield.</b>	
T. 17 S., R. 4 W., center sec. 7, south side of road, 50 feet east of lane south; iron post stamped "362"-----	362.031
Irving, 6.5 miles west of, on top of Fern Ridge, north side of road; iron post stamped "402"-----	402.015
Irving, 3.5 miles west of, 400 feet west of white house on north side of road, in center of road, in base of blazed white-oak tree; nail; aluminum tag in blaze stamped "375"-----	374.62
Irving, 9.2 miles west of, at intersection of Irving road with Elmira-Smithfield road, at northeast corner of crossroads; iron post stamped "395"-----	395.024
Smithfield, 1,200 feet north of flagpole at crossroads, at junction of Clear Lake and Smithfield-Junction City roads, in front of town hall; iron post stamped "430"-----	429.556
Smithfield, 0.6 mile north of, at top of long hill, center of road, in base of 36-inch oak tree blazed on two sides; nail with aluminum tag stamped "517.0"-----	517.39
Smithfield, 2.8 miles north of, at bridge over Long Tom Creek, also junction of Monroe road with Junction City road, on west side of road in front of house; iron post stamped "325"-----	324.606
<b>Point 5.5 miles west of Irving north along Fern Ridge Road to point 5.6 miles north of Fern Ridge Church.</b>	
Fern Ridge Church, 2.1 miles north of, at Upper Fern Ridge school, on hill back of ranch house overlooking Long Tom Creek; triangulation point; iron post stamped "375.7"-----	375.582
<b>Intersection of Fern Ridge-Junction City roads west along highway to Smithfield.</b>	
Fern Ridge road, 2.2 miles west of, at top of hill overlooking Smithfield, on west side of road, in base of stump; nail painted "U. S. 419.8 B. M."-----	419.68
<b>Point 4 miles west of Junction City west along highway 6 miles, thence north 3 miles.</b>	
Junction City, 4 miles west of, north edge of road at junction of T road, 200 feet east of bridge over Owens Creek, in base of 20-inch oak tree; spike with aluminum tag stamped "316"-----	315.63

## PRIMARY LEVELING.

71

Junction City, 4.7 miles west of, south edge of road, 200 feet east of junction of second-class road, 0.7 mile west of bridge over Owens Creek, in base of 36-inch pine, east of similar tree; spike with aluminum tag stamped "336 B. M. 2"-----	Feet. 335.88
Junction City, 9 miles west of, 1,000 feet east of Union schoolhouse, southeast corner of field fence, at Frank Thompson's ranch, at junction of Monroe and Junction City roads; iron post stamped "384 B 1909 1"-----	383.848
Point 9 miles west of Junction City west along highway to point 1 mile west of Union School (spur line).	
Union schoolhouse, 0.5 mile west of, at road junction, 50 feet south of fence corner, in base of 36-inch pine tree; spike; aluminum tag stamped "437"-----	436.74
Point 5.8 miles west of Junction City south and west along highway to sawmill (spur line).	
Sawmill, 0.25 mile east of, in floor of bridge over small creek; copper nail painted "350.8"-----	350.84

## HAISEY QUADRANGLE.

Point 2.5 miles east of Fergusson Bridge east along highway to Harrisburg.	
Fergusson Bridge, 2.5 miles east of, at junction of N.-S. road, 0.25 mile east of James Strong's ranch house, east side of road, opposite southeast corner of field; iron post stamped "310 B 1909 4"-----	310.538
Lancaster schoolhouse northwest along highway to point 7 miles southeast of Bruce.	
Lancaster schoolhouse, 1 mile north of, east edge of road, where road makes sharp turn, 500 feet north of C. Mortensen's ranch house, at north end of gate to field; iron post stamped "307 1909 B 5"-----	307.414
Lancaster schoolhouse, 3.1 miles northwest of, west one of three pine trees, on north edge of road, in south side of 30-inch tree blazed; spike with aluminum tag stamped "291 B. M. 24"-----	291.10
Monroe, 3 miles east of, 1 mile west of Flat Creek, 350 feet west of R. H. Hewitt's ranch house, northwest corner of field at junction of road to south; iron post stamped "280 B 1909 6"-----	280.413
Point 2.3 miles northeast of Monroe east along highway to Ingram's Ferry.	
District No. 5 schoolhouse, 500 feet east of, 60 feet north of road junction, in base of 20-inch cottonwood tree; spike with aluminum tag stamped "281 B. M. 48"-----	281.18
Ingram's Ferry, west bank of Willamette River, 15 feet north of road, in base of 20-inch cottonwood tree; spike with aluminum tag stamped "283 B. M. 49"-----	283.21
Harrisburg northwest along highway on east bank of Willamette River to Lake Creek school, thence north to township line, thence east to Brownsville.	
Harrisburg, 3.2 miles north of, southwest corner of yard to white frame house at crossroads; iron post stamped "292 B 1909 13"-----	292.156
Harrisburg, 7 miles northwest of, northwest corner of field, 60 feet south of large barn, at V. Owens's ranch; iron post stamped "280 B 1909 14"-----	279.700



Lake Creek schoolhouse, 1.8 miles north of, southwest corner of field, at crossroads; iron post stamped "271 B. M. 85"-----	Feet. 270. 750
Lake Creek, 0.6 mile north of, 150 feet east of intersection of crossroads, 150 feet north of white house, northwest corner of yard, in base of 20-inch oak tree; spike with aluminum tag stamped "287 B. M. 86"-----	287. 42
Lake Creek, 1.3 miles north of, 0.6 mile east of, north side of road, east end of cottonwood grove, in base of 24-inch cottonwood tree; spike with aluminum tag stamped "268 B. M. 87"-----	268. 52
Halsey, 4.3 miles northwest of, at angle in road, southwest corner of field, opposite old cabin, 0.5 mile south of schoolhouse; iron post stamped "270 B 1909 21"-----	270. 513
Halsey, 100 feet north of station, 18 feet east of track, on line with north margin of street to east; iron post stamped "281 B 1903"---	281. 562
Halsey, 3 miles east of, north edge of road, 800 feet east of bridge, 10 feet east of telephone pole; iron post stamped "283 B 1909 22"-----	282. 742
Brownsville, 1.8 miles west of, at junction of road to south, in base of 48-inch oak tree; spike with aluminum tag stamped "307 B. M. 95"-----	306. 63
Brownsville, 1 mile west of, south edge of road, west edge of right of way, at railroad crossing; iron post stamped "319 B 1909 23"-----	318. 550
<b>Harrisburg east along highway to Diamond Hill school, thence northwest to Southern Pacific Railroad, thence northeast along railroad to point near Brownsville.</b>	
Harrisburg, 2.3 miles east of, northeast corner of field, at junction of north-south road, in base of 36-inch oak tree; spike with aluminum tag stamped "312 B. M. 66"-----	312. 40
Harrisburg, 3.4 miles east of, where road turns east, 100 feet north of large barn, southwest corner of field; iron post stamped "314 B 1909 15"-----	314. 119
Harrisburg, 6.7 miles east of, 2.6 miles west of Diamond Hill schoolhouse, south side of road, at cross fence line; iron post stamped "320 B 1909 16"-----	320. 340
Diamond Hill schoolhouse, 1.2 miles northwest of, east edge of road, 500 feet north of gate to second-class road, 400 feet north of point where road turns east, 150 feet west of barn; iron post stamped "354 B 1909 17"-----	353. 703
Twin Buttes station, 0.5 mile west of, 1.6 miles north of Union Center schoolhouse, 15 feet west of southeast corner of yard of frame house, opposite large barn, at intersection of road to west; iron post stamped "309 B 1909 18"-----	308. 940
<b>Point 0.5 mile west of Twin Buttes station east along highway to Southern Pacific Railroad.</b>	
Halsey, 3 miles south by 2 miles east of, south side of road, 10 feet east of gate to barnyard, at white frame house, in base of telephone pole; spike with aluminum tag stamped "301 B. M. 78"-----	301. 20
<b>Point 1.2 miles east of Harrisburg north along highway to point 2 miles north of Muddy Creek.</b>	
Rowland, 1.2 miles north of, at Pikes schoolhouse (District No. 45), northwest corner of school yard, east edge of road; iron post stamped "303 B 1909 19"-----	302. 985

Point 3.2 miles north of Halsey east along county road to point about 4 miles northeast of Halsey.

Halsey, 3.2 miles north of, east of railroad, 4 feet from milepost 678, at fence line; iron post stamped "266 B 1903"-----	Feet. 266. 594
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Halsey, 2.9 miles north by 2.1 miles east of, south side of west entrance to covered bridge over Calapoolia River; copper tack on girder of bridge-----	278. 18
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Halsey, 2.9 miles north by 2.9 miles east of, 25 feet from west approach to bridge over Soddum ditch, south side of road at fence line; iron post stamped "276 OREGON"-----	275. 855
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Point 1.8 miles west of Plainview along roads to point 2 miles north of Shedd, thence west and south to permanent bench mark 4.3 miles northwest of Halsey.

Plainview, 1.8 miles west by 1.2 miles north of Saddle Butte, northwest corner of T road north, in base of milepost; spike with aluminum tag stamped "260"-----	260. 04
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Plainview, 1.7 miles north by 1.8 miles west of, 2.6 miles north of Saddle Butte, southwest corner of crossroads; iron post stamped "271 OREGON"-----	270. 980
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Shedd, 1.9 miles north of, east edge of right of way of Southern Pacific Railway, at third telegraph pole south of milepost 682; iron post stamped "249 B 1903"-----	249. 485
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Shedd, 1.3 miles north by 3 miles west of, at northeast corner of T road north, 300 feet east of angle in road; iron post stamped "252 ORE"-----	251. 691
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Shedd, 3.1 miles west by 1 mile south of, 100 feet east of southeast corner of T road south; iron post stamped "270 ORE"-----	270. 002
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Shedd, 2.5 miles south by 3.4 miles west of, 0.7 mile north of Harmony school, at southeast corner of culvert; copper tack with aluminum tag stamped "260"-----	260. 23
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Halsey, 4.3 miles northwest of, 0.5 mile south of Harmony school, opposite old cabin, at southwest corner of field; iron post stamped "270"-----	270. 518
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Point 3.5 miles west of Shedd west along road via Peoria to point 3 miles south of Peoria.

Peoria, 0.9 mile south of, west side of road, opposite farmhouse; iron post stamped "260 ORE"-----	259. 632
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Peoria north along roads to point 4 miles northwest of Shedd.

Peoria, 2.2 miles north of, on east side of road, 1,000 feet south of large red barn; iron post stamped "238 ORE"-----	237. 904
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Peoria, 3.5 miles north of, at northeast corner of T road east, copper tack in root of 16-inch maple tree; aluminum tag stamped "240"-----	240. 00
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Peoria, 3.5 miles north by 0.9 mile east of, 0.4 mile west of bridge over Muddy Creek, at northwest corner of turn in road; iron post stamped "232 ORE"-----	232. 238
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Peoria, 4.2 miles northeast of, 3 miles west by 2.4 miles north of Shedd, at northeast corner of T road east; copper tack in root of 14-inch quaking asp tree; aluminum tag stamped "254"-----	253. 84
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Peoria west 2.8 miles.

Peoria, 2.8 miles west of, by wagon road, on north side of road; iron post stamped "244 ORE"-----	244. 241
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## EUGENE QUADRANGLE.

Eugene west 7 miles and north 7 miles, thence east to Irving.

	Feet.
Eugene, University of Oregon, in northeast corner of front face of Willard Hall; aluminum tablet stamped "1903-B-449"-----	449. 317
Eugene, 1 mile south and 3 miles west of, at southwest corner of T road south, northwest corner of sec. 1, T. 18 S., R. 4 W.; iron post stamped "421"-----	420. 574
Eugene, 1.25 miles south and 4.5 miles west of, at bend in road south, 200 feet east of T road north, at section corner; top of stone-----	405. 80
T. 18 S., R. 4 W., west central part of sec. 4, north of road in edge of timber, in large rock; aluminum tablet stamped "443"-----	442. 889
Eugene, 2.25 miles south and 7.5 miles west of, north of road, on rock; chiseled square-----	785. 38
T. 17 S., R. 4 W., corner of secs. 29, 30, 31, and 32, in corner of field at northwest corner of T road west; iron post stamped "389"-----	388. 535
T. 17 S., R. 5 W., sec. 24, northeast corner of, west of road, in northeast corner of Peter Carlson's yard; iron post stamped "385"-----	385. 165
T. 17 S., R. 4 W., center of sec. 7, south of road, 50 feet east of lane south; iron post stamped "362"-----	362. 031
Eugene, 4.9 miles north of, at highway crossing, east of track, north of road; iron post stamped "1903-B-382"-----	382. 463

## Eugene to Goshen.

Eugene, 2.5 miles south of, in front of white house, on stone; chiseled square-----	468. 09
T. 18 S., R. 3 W., SW. $\frac{1}{4}$ sec. 8, east of road, 100 feet northwest of white house on G. T. Roe's ranch; iron post stamped "464"-----	463. 582
Goshen, 0.8 mile north of, west of track, 135 feet south of milepost 643, at fence line; iron post stamped "1903-B-493"-----	493. 960

## Eugene via Armitage and Springfield to Henderson.

Eugene, 3 miles north of, north of road at T road south, 0.5 mile east of C. W. Young's home; iron post stamped "419"-----	419. 436
Armitage, 400 feet south of station, 10 feet west of road, 30 feet south of railroad; iron post stamped "424"-----	423. 577
T. 17 S., R. 3 W., west-central part of sec. 26, south of road, 35 feet west of railroad track; iron post stamped "443"-----	442. 915
Henderson, 30 feet west of main track, 35 feet south of station sign; iron post stamped "1903-B-446"-----	447. 160

## Armitage via Coburg to Irving.

Coburg, southern part of town, west of county road, 7 feet inside of fence, opposite first street east; iron post stamped "399"-----	399. 336
T. 17 S., R. 4 W., NE. $\frac{1}{4}$ sec. 1, at T road west, 40 feet north of road west, west of road running north, 1 foot from fence; iron post stamped "376"-----	376. 174
Eugene, 4.9 miles north of, at highway crossing, east of track, north of road; iron post stamped "1903-B-382"-----	382. 463

**Coburg to Harrisburg.**

	Feet.
Coburg schoolhouse, 2.5 miles north of, west of Brownsville road, inside fence; iron post stamped "370"-----	370. 297
Wilkins station, 1.2 miles north and 1 mile west of, center of road in front of Wyatt schoolhouse; iron post stamped "337"-----	337. 792
Harrisburg, 1.6 miles south of, south of Harrisburg-Coburg road at bend to west, inside fence; iron post stamped "319"-----	319. 306
Harrisburg, 140 feet south of station, 15 feet east of track, at telegraph pole; iron post stamped "1903-B-307"-----	307. 653

**Point 5.6 miles north of Fern Ridge Church north and east along highway to Junction City.**

Smithfield, 6.3 miles north of, 3 miles west of Junction City, 500 feet east of Long Tom Creek bridge at small culvert on south side of road; iron post stamped "317"-----	316. 538
Junction City, 1 mile northwest of, at junction of Corvallis and Junction City roads, on west side of road, in front of house; iron post stamped "318"-----	318. 375

**MONROE QUADRANGLE.**

**Point 2.5 miles east of Fergusson Bridge west along highway up Beard Creek.**

Liberty schoolhouse, 2.3 miles east of, 4.3 miles south of Monroe, 500 feet east of large house with red windmill tower at junction of north-south roads, northeast corner of field; iron post stamped "317 B 1909 3"-----	317. 287
Union schoolhouse, 1.7 miles north of, 0.7 mile west of Liberty schoolhouse, 300 feet north of Fergusson Creek, at junction of T road; iron post stamped "347 B 1909 2"-----	346. 668

**Spur line.**

Beard Creek, 1 mile northwest of, 50 feet east of cabin, east edge of road at clearing, in root of stump; copper nail painted "402"-----	402. 39
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**Point 2.5 miles east of Fergusson Bridge northwest along highway to Monroe.**

Harmony schoolhouse, 2 miles northwest of, 2.9 miles east of Monroe, north side of road, at junction of road to north, southwest corner of fence at C. Tracer's ranch; iron post stamped "290 B 1909 7"-----	289. 594
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**Point 4.3 miles south of Monroe north along highway to Bruce.**

Monroe, 50 feet west of bridge over Long Tom Creek, south end of town at junction of Monroe and Eugene roads, northwest corner of lot; iron post stamped "287 B 1909 8"-----	287. 131
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**Point 7 miles southeast of Bruce northwest along highway to Bruce.**

Monroe, 2.3 miles northeast of, 1.7 miles west of Flat Creek, at junction of road to west, in base of 36-inch cottonwood tree; spike with aluminum tag stamped "279 B. M. 26"-----	279. 00
Bruce, 4.9 miles southeast of, 1,000 feet west of gate to J. E. Coleman's ranch, 50 feet north of road junction, west side of road, at fence line; iron post stamped "276 B 1909 12"-----	275. 969

Monroe west along highway 2.5 miles, thence north 6 miles, thence east to Bruce.

Monroe, 2.9 miles northwest of, southeast corner of field at junction of Bellfountain and Walters roads; iron post stamped "283 B 1909 9"-----	Feet. 283. 431
Bellfountain, 0.5 mile east of, 100 feet north of junction of road to east, at bent of road, 200 feet west of house, in base of 36-inch oak tree; spike with aluminum tag stamped "362 B. M. 38"-----	362. 49
Bellfountain, 1 mile north of, 300 feet north of white house, east edge of road, south end of gate to second-class road through Fir Grove farm, where road goes over small ridge; iron post stamped "371 B 1909 10"-----	371. 108
Bellfountain, 2 miles north by 0.9 mile east of, south side of road, 0.5 mile east of F. Watkin's ranch, in base of 12-inch ash tree; spike with aluminum tag stamped "277 B. M. 41"-----	277. 63
Muddy Creek, 0.3 mile east of, southeast corner of field, where road makes sharp turn to north; iron post stamped "260 B 1909 11"----	259. 746

Point 3 miles northwest of Monroe southwest along highway to Glenbrook (spur line).

Glenbrook, 50 feet west of bridge over small creek, 1,000 feet north of railroad crossing, southeast corner of yard, in base of 30-inch pine tree blazed; spike painted "354"-----	354. 49
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Point 4 miles west of Peoria south along roads to point 5 miles southwest of Peoria.

Peoria, 4 miles west of, 8 miles south of Corvallis, at northeast corner of T road east, in root of 24-inch maple tree; copper tack with aluminum tag stamped "254"-----	253. 68
Peoria, 4 miles west by 1.3 miles south of, 0.3 mile west of Irwin Butte, on east side of road, at fence line; iron post stamped "253 ORE"-----	252. 835

Point 4.5 miles northwest of Peoria north along roads to point 4 miles south of Corvallis.

Peoria, 4 miles west by 2 miles north of, on west side of road; iron post stamped "247 ORE"-----	247. 095
Corvallis, 4.3 miles south of, on west side of State road, opposite farm house and white "Samson" windmill tank, in base of telephone pole; spike with aluminum tag stamped "240"-----	240. 124

#### BROWNSVILLE QUADRANGLE.

Point 4 miles southeast of Shedd east and north to point 1.3 miles west of Plainview.

Shedd, 0.7 mile south by 3.4 miles east of, 0.5 mile south by 0.5 mile east of Saddle Butte, on east side of road; iron post stamped "271 ORE"-----	271. 045
Shedd, 0.8 mile north by 3.4 miles east of, at northwest corner of T road west, 500 feet south of schoolhouse (District 29), spike in base of telephone pole; aluminum tag stamped "265"-----	265. 39

PRIMARY LEVELING.

77

Point 1 mile southwest of Brownsville to point 2.9 miles northwest of Brownsville.

Brownsville, 1 mile southwest of, west side of right of way, south side of road, at railroad crossing; iron post stamped "319"-----	Feet. 318.559
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Brownsville to point 2.7 miles east of.

Brownsville, 1.9 miles east of, at north end of jog in road, in root of cottonwood tree; copper tack with aluminum tag stamped "361"---	360.58
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Point 1 mile west of Brownsville to point 3.7 miles northeast of Brownsville (spur line).

Brownsville, 3.7 miles northeast of, 1,000 feet north of schoolhouse, west side of road, in base of 36-inch oak tree; spike scribed and painted "403"-----	403.45
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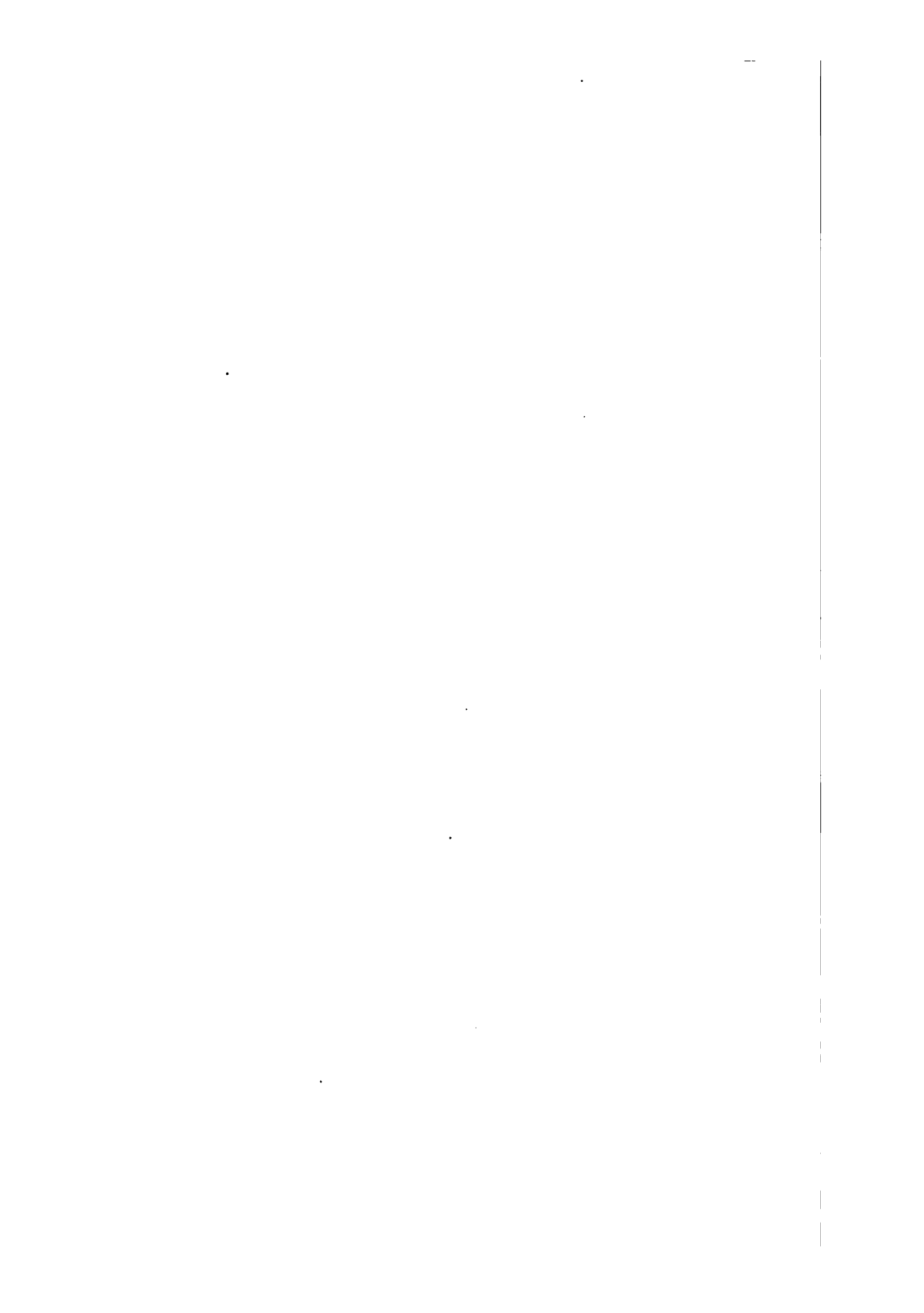
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